SERVICE MANUAL

Bel-Cat

To service personnel

* **Read this "Service Manual" thoroughly before repair working.**
* **Bring this "Service Manual" at the time of repair.**

TAKARA BELMONT CORPORATION.

Before Starting Repair Work

Please be sure to read this “Service Manual” before starting repair work and fully understand the contents. Some repair works involve risks in adjustment, confirmation, etc. So be very careful about the safety when performing such works. The repair works shall be performed by a qualified personnel or a person who completed the training specialized in repair at our company.

This service manual is the document which describes the proper repair method and items necessary to maintain quality, effectiveness and safety of this medical equipment.
Be sure to follow the procedure and the contents written in the manual.

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01. Introduction

1. Read the Operation Manual of the equipment thoroughly before maintenance.

2. The operating procedure of panoramic exposure forms the basis of all operations. So become fully familiar with its procedure before taking other exposure mode.

3. Be sure to observe the warnings and prohibited matters in the body of this Service Manual strictly.

4. Read this Service manual in order from the beginning.
Reading only portions of the manual may cause accidents or breakage of the equipment from improper maintenance.

5. If you find any unclear point during a repair work, read this Service Manual again to check about it and restart the repair work.

6. Disclaimer
Follow all information in this Service Manual. Takara Belmont USA, Inc is not responsible for malfunction, accidents or other such incidents resulting from improper maintenance.

7. Warranty period
This equipment is warranted for a period of one year from purchase. Repair will be provided free of charge only in cases of malfunction or damage to equipment in the course of ordinary use.

8. Serviceability of Equipment and Period of Spare Parts Availability
Service and spare parts will be available for ten years from discontinued production of this equipment.

9. When disposed, this equipment constitutes industrial waste.
Please contact the agent, or contract for disposal with an industrial waste handler licensed as legislated and regulated by the local governing authority.

02. Warnings

⚠ Warning

Read this Service Manual at time of repair and follow the instructions.
If the repair will fail, it will cause the damage of the equipment and cause of the trouble.
Pay special attention to all Dangers, Warnings, and Cautions as described.

Note

Cautionary terms in this Service Manual are defined as follows.

⚠ Danger

Used to describe a direct danger which, if not avoided, might foreseeable lead to occurrence of death or serious injury, total loss of equipment, fire, or other severe accidents or damage to property.

⚠ Warning

Used to describe an indirect danger which, if not avoided, might foreseeably lead to occurrence of death or serious injury, total loss of equipment, fire, or other severe accidents or damage to property.

⚠ Caution

Used to describe a potential danger which, if not avoided, might cause mild or moderate injury, partial damage to equipment, or loss of electronic data.

Note

Used to indicate helpful information for use of this equipment.

⚠ Warning

Cautions for use of medical electrical equipment (hazard prevention and safety)

1. This equipment is for use only by trained personnel.

2. Observe the following cautions when installing this equipment.

(1) Install in a dry location.
(2) Install in a location free from potential negative effects due to atmospheric pressure, temperature, humidity, wind, sunlight, dust, air containing chlorine or sulfur compounds, and other such causes.
(3) Ensure safety against tilting, vibration, or impact (including during transport).
(4) Do not install in a location where chemical agents are stored or gases are produced.
(5) Pay attention to the supplied power frequency and voltage and allowable current (or power consumption).
(6) Check the power status of batteries (e.g., discharge state, polarity).
(7) Connect grounds correctly.

3. Observe the following before using this equipment.

(1) Inspect switch connections, polarity, dial settings, meters, and other elements to ensure proper operation of the equipment.
(2) Check that grounds are fully connected.
(3) Check that all cords are connected properly and safely.
(4) Take special care with joint use of other equipment, which can lead to improper diagnosis and cause hazards.
(5) Re-inspect external circuits connected directly to the patient.
(6) Check battery power.

4. Observe the following during use of this equipment.

(1) Use care not to exceed the duration or amount of exposure needed for diagnosis and treatment.
(2) Monitor all equipment and the patient continually for problem-free status.
(3) If any problems in the equipment or patient are discovered, discontinue operation of the equipment with the patient in a safe status, or take other appropriate measures.
(4) Make sure that the patient is not touching the equipment.

5. Observe the following after use of this equipment.

(1) Follow the prescribed order to return operating switches, dials, and other components to their pre-use status, and then switch off power.
(2) Do not use excessive force such as yanking the cord, when disconnecting cords.
(3) Observe the following with regard to storage locations.
I) Store in a dry location.
II) Store in a location free from potential negative effects due to atmospheric pressure, temperature, humidity, wind, sunlight, air containing chlorine or sulfur compounds, and other such causes.
III) Ensure stability against tilting, vibration, or impact (including during transport).
IV) Do not store in a location where chemical agents are stored or gases are produced.
(4) Clean accessories, cords, conductors, and other such items before putting them away.
(5) Always leave equipment in a clean state to avoid malfunction during the next use.

6. If malfunction occurs, post appropriate signage to prevent use, and contact trained personnel for repair.

7. Do not modify the equipment.

8. Periodic Maintenance

(1) Perform periodic maintenance of all equipment and components.
(2) Before resuming use of any equipment not used recently, be certain to check that the equipment operates normally and safely.

⚠ DANGER

Liquids on this equipment will cause electric shock accident or equipment damage.
This equipment is electric equipment. Keep liquids away from this equipment.

⚠ DANGER

This equipment is electric equipment and has some high-voltage portions inside.
Turn off the power of equipment and unplug power cable from electrical outlet before opening cover of equipment for repair work.

⚠ DANGER

Some repair works involve risks.The repair works shall be performed by a qualified personnel or a person who completed the training specialized in repair at our company.

⚠ DANGER

Some repair works involve risks. Service personnel must give instructions to outsiders to stay away from repair work area.

⚠ WARNING

Do not modify medical electronic devices.

Regulations such as the following apply to manufacturers, based on the Pharmaceutical Affairs Law. Medical devices require item-specific manufacturing approval, and an “Application for Approval of Partial Changes” is mandatory for any “functional modifications” of medical devices; unauthorized modifications are prohibited.

⚠ WARNING

Radiation Protection in Dentistry

Comply with the contents of each clause regarding protection against radiation exposure prescribed in relevant medical regulations when installing and using dental X-ray equipments.

⚠ WARNING

This equipment for radiograph can cause hazard to service personnel if safe exposure conditions and how to use are not complied with.

⚠ WARNING

Be sure to sterilize equipment portions to be touched by patient or operator before starting repair work. After completing the repair work, sterilize equipment portions touched by service personnel.

⚠ WARNING

While repairing, do not place anything that can be an obstacle within the range of equipment.

⚠ WARNING

To avoid damages to equipment, measuring instruments, etc. and electric shock, service personnel must not remove covers of equipment except when necessary.

⚠ WARNING

To avoid damages to equipment, measuring instruments, etc. and electric shock, turn off power of equipment and take extra care not to short-circuit with other circuit when connecting lead wire of measuring instrument to a circuit within the equipment during repair work.

⚠ WARNING

To avoid damages to equipment, measuring instruments, etc. and electric shock, be sure to turn off power of equipment and use the parts specified by us when replacing machine parts and electric parts of the equipment.

⚠ WARNING

To avoid X-ray exposure due to carelessness, be sure to install lead plate for X-ray protection on X-radiation aperture of X-ray generator when radiating X-rays during repair work.

⚠ WARNING

Be sure to use positioning attachment specified for each exposure mode when positioning patient.

⚠ WARNING

Be sure to make patient and assistants to wear X-ray protective clothing. (Assistants in this sentence means a person allowed by doctor.)

⚠ WARNING

Be sure to operate X-ray exposure switch from outside of X-ray room.

⚠ WARNING

Operator must instruct patient not to move while X-ray exposure.

⚠ WARNING

Watch patient, assistants and equipment constantly while X-ray exposure, and release X-ray exposure switch immediately if you find something abnormal.

⚠ WARNING

When disposing this equipment, contact the dealer you purchased.

⚠ WARNING

After completing repair work, be sure to turn OFF power for safety.

⚠ CAUTION

When X-ray exposure to the patient after completing repair work, take extra care for patient safety when positioning the patient.

⚠ CAUTION

Damage inside X-ray generator etc cannot be repaired on site. Depending on service personnel's judgment, the equipment will be returned to factory for repair or replacement.

⚠ WARNING

Responsibility for managing the use and maintenance of medical equipments lies with the user (hospital or clinic). This equipment must be used by doctor or qualified person only.

As repair or check inside equipment involves risks, contact the dealer you purchased from.

⚠ WARNING

When earthquake warning is issued, do not use this equipment.
After an earthquake, be sure to conduct maintenance check of the equipment and confirm no abnormality before use. Default of the check and/or confirmation can harm patient.

⚠ WARNING

Be sure to set up X-ray examination room and install the equipment body in the X-ray examination room.

⚠ WARNING

Do not place anything that can be an obstacle within the range of equipment movement.

⚠ WARNING

X-ray exposure and approach to equipment must be done under the responsibility of user when repairer, patient,
or nursing attendant allowed by doctor has a pacemaker etc.

⚠ WARNING

Be sure to use positioning attachment specified for each exposure mode when positioning patient.

⚠ WARNING

Be sure to make patient and assistants to wear X-ray protective clothing.
(Assistants in this sentence means a person allowed by doctor.)

⚠ WARNING

Operator must instruct patient not to move while X-raying.

⚠ WARNING

Be sure to sterilize and disinfect equipment portions touched by patient or operator after X-raying and at daily closing time.

⚠ WARNING

To avoid equipment failure, do not rotate arm by hand.

⚠ WARNING

Keep patient unmoved until arm reset operation completed after X-ray exposure.

⚠ CAUTION

Take extra care for patient safety when positioning patient.

⚠ CAUTION
Take extra care for patient safety when moving sliding unit up and down.

⚠ CAUTION
The laser beam line uses a safe laser beam. Do not look straight at positioning laser beam for your safety. Also, give this caution to patient and nursing attendant.

⚠ CAUTION
Irradiate beam line to the patient`s eyes.

03. Preparation for Repair Work

1. Manuals

* Bel-Cat Service Manual
* Bel-Cat Operation Manual

2. Measuring Instruments

1) Digital multi-meter
2) Oscilloscope
3) Lead Wires for measurement
4) Insulation-resistance meter
5) X-ray detecting paper

3. Tools

1) Phillips screwdriver(Large size, small size)
2) Flat-braded screwdrivers small size(Insulated type)
3) Box drivers (for M3, 4, 5, 6 screws)
4) Hexagonal wrench (a set of wrenches)
5) Nipper
6) Long-nose pliers
7) Electric soldering iron (insulated-type), solder
8) Taps for thread
9) Tap handle
10) Electric drill
11) Drill
12) Crimp tool (for crimping terminal)

4. Jigs for Adjustment

1) Test piece
2) Lead plate with thickness of 3mm or more (for X-ray protection)
3) Brass plate filter with thickness of 2mm
4) Aluminum filter with thickness of 35mm
5) X-ray detecting paper

5. Repair and Service Parts

1) Depending the contents of repair, please prepare necessary boards, parts, wire harness, etc.

6. Other

1) Depending the contents of repair, please prepare screws, nuts, crimping terminals, grease, etc.
2) Alcohol for disinfection
3) Cloth
4) Clearing solvent

04. Specifications and configuration for the equipment

General name	Arm Type X-ray CT diagnostic equipment		
Product Name	Bel-Cat Series		
Model	Bel-Cat	Bel-Cat PA	Bel-Cat CM
Voltage	AC120V, 60Hz, single phase		
Power consumption	2.0 kVA		
High tension generator	Inverter system		
X-ray generator			
Tube voltage	60-95 kV (1 kV increment)		
Tube current	2-12 mA (1 mA increment)		
Focal Spot	0.5 mm		
Total filtration	2.5 mmAl (min)		
Acquisition modes			
CCD Panoramic		P	P
Panoramaic			
CCD length	138mm (H)		
Exposure mode	Adult / Child / Ortho		
Magnification ratio	1.25x		
Exposure time	Short-time ※1 : 9 sec Normal: 12 sec		
TMJ 4-sections (lateral)			
CCD length	138 mm (H)		
Magnification ratio	1.21x		
Exposure time	3 sec × 4		
TMJ 2-sections (frontal)			
CCD length	138 mm (H)		
Magnification ratio	1.7x		
Exposure time	3 sec × 2		
Maxillary sinus			
CCD length	138 mm (H)		
Magnification ratio	1.21x		
Exposure time	8 sec		
CCD Cephalometric			P
Frontal / Lateral			
Acquisition area	Lateral: Normal 250 mm (W) × 220 mm (H), Short-time 180 mm (W) × 220 mm (H) Frontal: 200 mm (W) × 220 mm (H)		
Magnification ratio	1.1x		
Exposure time	Lateral: Short-time 2.9 sec, Normal 4 sec Frontal: 4 sec		
Carpus bone	(Option)		
Acquisition area	200 mm (W) × 220 mm (H)		
Magnification ratio	1.0x		
Exposure time	4 sec		
FPD Panoramic	P		
Panoramaic			
FPD height	130 mm (H)		
Exposure mode	Adult / Child		
Magnification ratio	1.25x		
Exposure time	16.8 sec		
TMJ 4-section (lateral)			
FPD height	130 mm (H)		
Magnification ratio	1.21x		
Exposure time	3 sec × 4		
CT	P	P	P
D mode			
FOV	Φ 51mm × 51mm (H)		
Imaging region	L8 – R8 / L-TMJ / R-TMJ		
Voxel size	0.1 mm		
Exposure time	Short-time (180º) 8.5 sec Normal (360º ※2) 17 sec		
I mode			
FOV	Φ79 mm × 71 mm (H)		
Imaging region	Dentition / L-TMJ / R-TMJ		
Voxel size	0.155 mm		
Exposure time	Short-time (180º) 8.5 sec Normal (360º ※2) 17 sec		
Positioning beams	3 beams		
Total weight	298 kg	298 kg	338 kg
Dimensions (W)	1010	1010	1900
(mm) (D)	1300	1300	1300
(H)	2360	2360	2360

※1 “Fast”is displayed on Operation panel instead of “short time”.

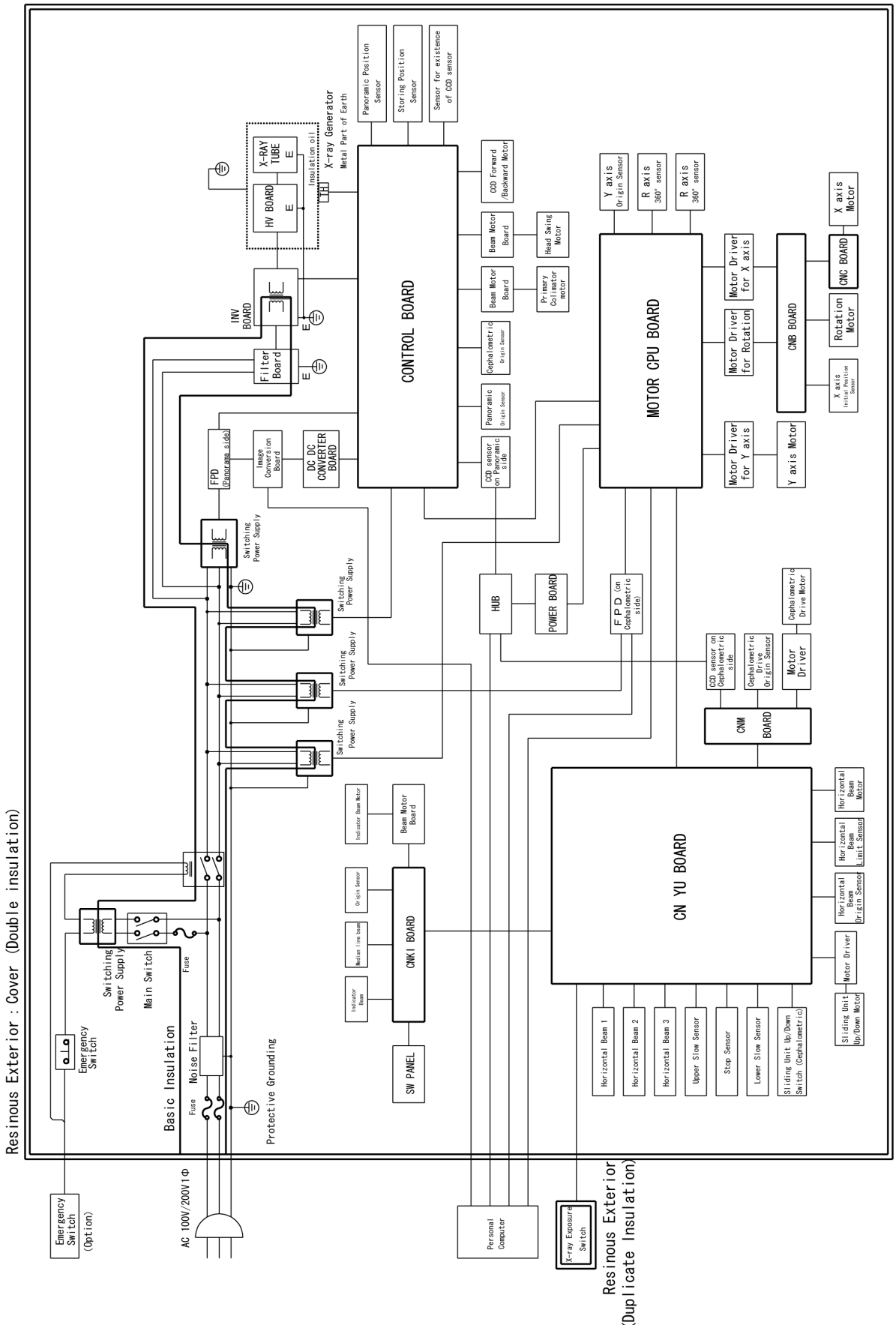
※2 Imaging may be 270°, depending on patient position.

Operational environment
Temperature : 5 to 35ºC
Humidity : 30 to 85%
Atmospheric pressure: 700 to 1060 hpa

Storage environment
Temperature: -10 to 60ºC
Humidity : 10 to 95%
Atmospheric pressure: 700 to 1060 hpa

Transportation environment
Temperature: -10 to 60ºC
Humidity : 10 to 95%
Atmospheric pressure: 700 to 1060 hpa

Bel-Cat series Block Diagram



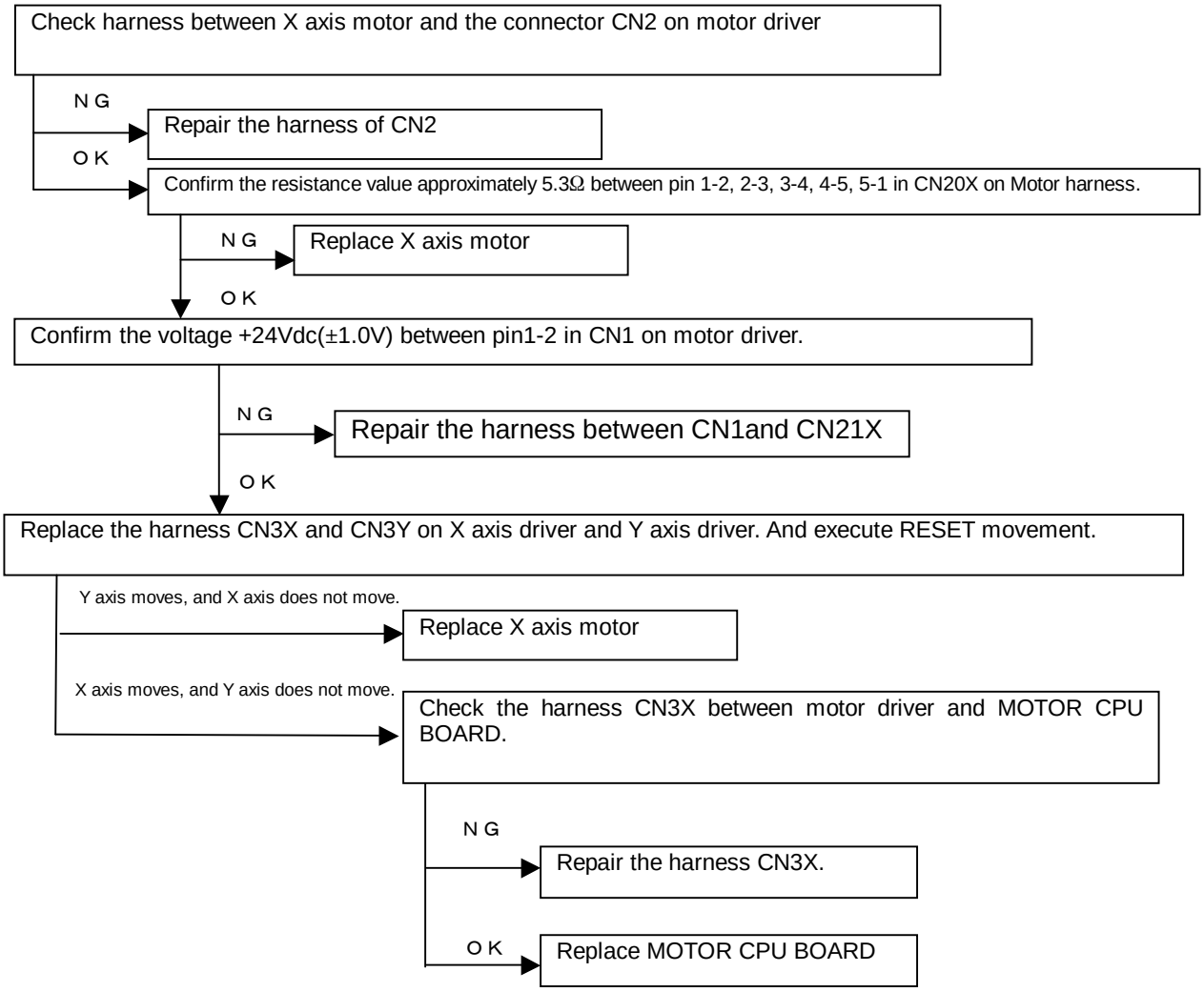
05. Trouble shooting

Note 1. To avoid an electric shock, be sure to unplug power cable from electrical outlet before maintenance. Also, confirm whether it is shorted out or not before plug power cable to electrical outlet.
Note 2. Be sure to check that measuring devices and other devices do not interfere with X-ray equipment before the X-ray equipment is activated.
Note 3. For checking of wire-harnesses, be sure to check all of the electric conduction, the wirings, connectors, and connector pins.

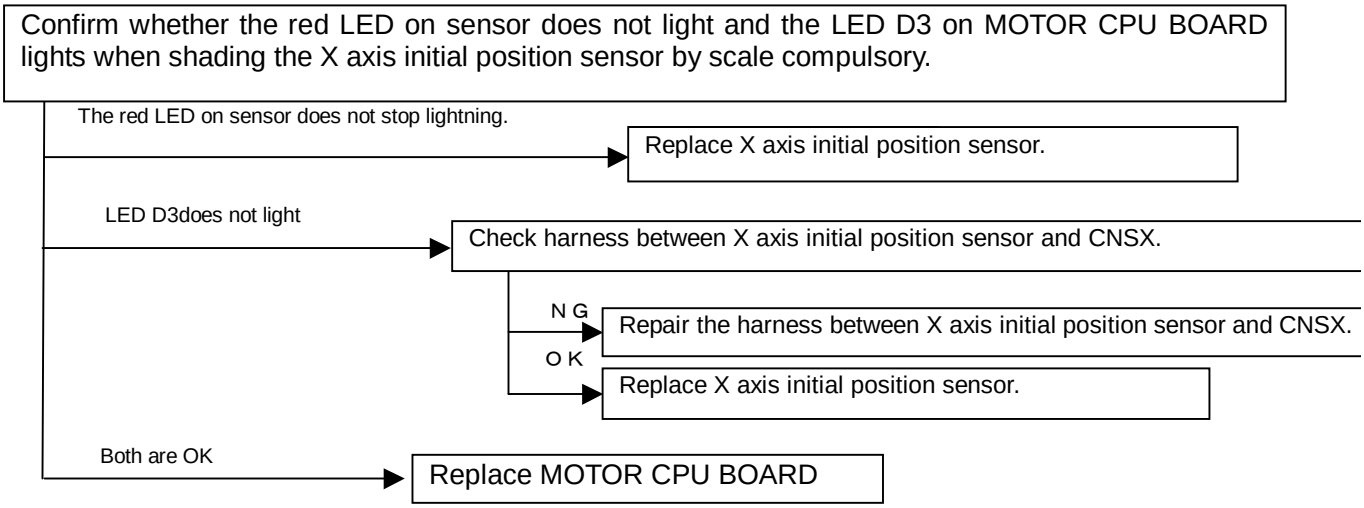
Error Number	Error Message
201	Rotation of X motor is error. Click RESET button.

Problem 1）X axis motor does not move at all.
2）The abnormal sound comes out while movement of X axis motor.
Corresponding

1) X axis motor does not move at all.


Check harness between X axis motor and the connector CN2 on motor driver
N G
Repair the harness of CN2
O K
Confirm the resistance value approximately 5.3Ω between pin 1-2, 2-3, 3-4, 4-5, 5-1 in CN20X on Motor harness.
N G
Replace X axis motor
O K
Confirm the voltage +24Vdc(±1.0V) between pin1-2 in CN1 on motor driver.
N G
Repair the harness between CN1and CN21X
O K
Replace the harness CN3X and CN3Y on X axis driver and Y axis driver. And execute RESET movement.
Y axis moves, and X axis does not move.
Replace X axis motor
X axis moves, and Y axis does not move.
Check the harness CN3X between motor driver and MOTOR CPU BOARD.
N G
Repair the harness CN3X.
O K
Replace MOTOR CPU BOARD

2) The abnormal sound comes out while movement of X axis motor.

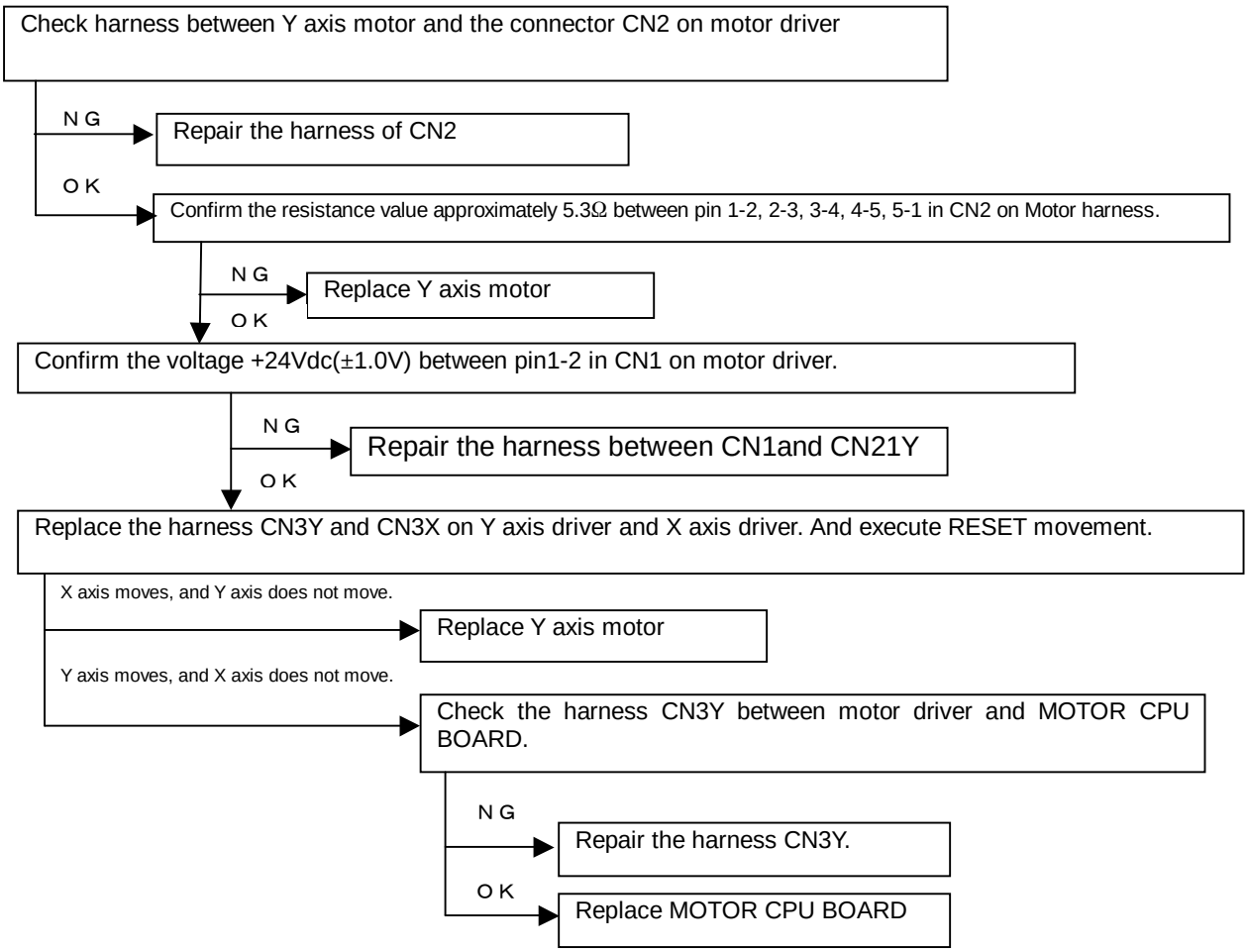

Confirm whether the red LED on sensor does not light and the LED D3 on MOTOR CPU BOARD lights when shading the X axis initial position sensor by scale compulsory.
The red LED on sensor does not stop lightning.
Replace X axis initial position sensor.
LED D3does not light
Check harness between X axis initial position sensor and CNSX.
N G
Repair the harness between X axis initial position sensor and CNSX.
O K
Replace X axis initial position sensor.
Both are OK
Replace MOTOR CPU BOARD

Error Number	Error Message
202	Rotation of Y motor is error. Click RESET button.

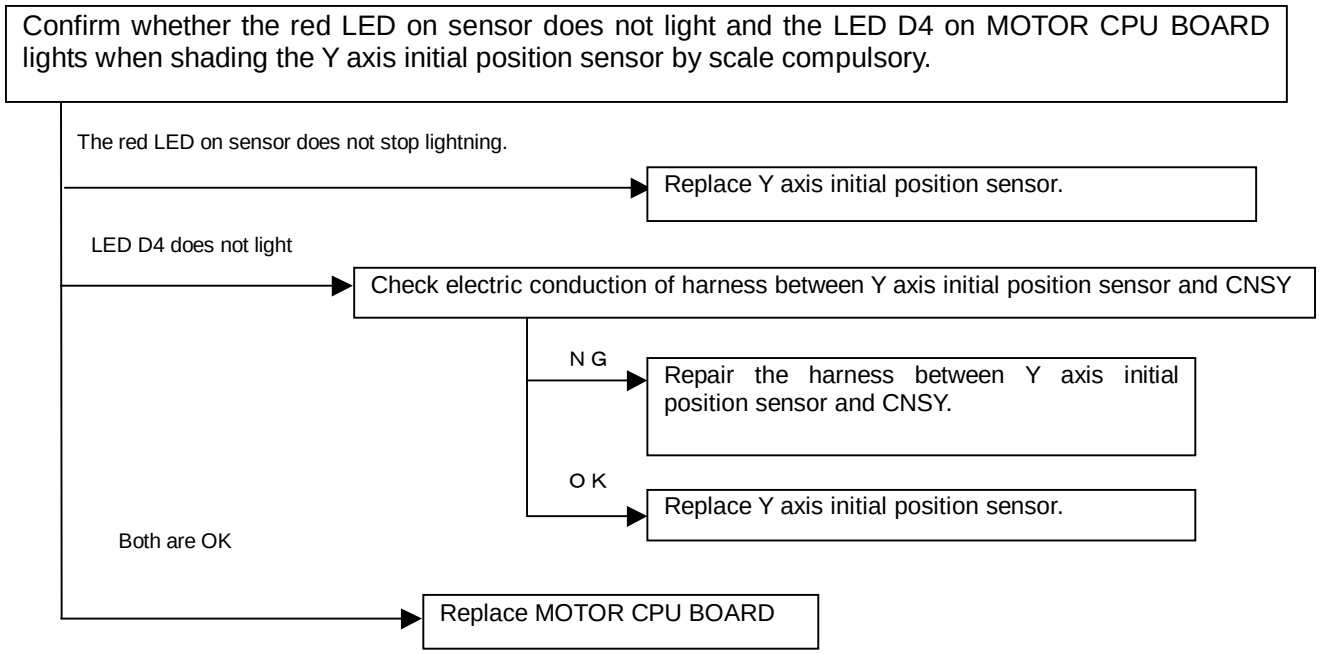
Problem 1) Y axis motor does not move at all.
2) The abnormal sound comes out while movement of Y axis motor.

Corresponding

1) Y axis motor does not move at all.

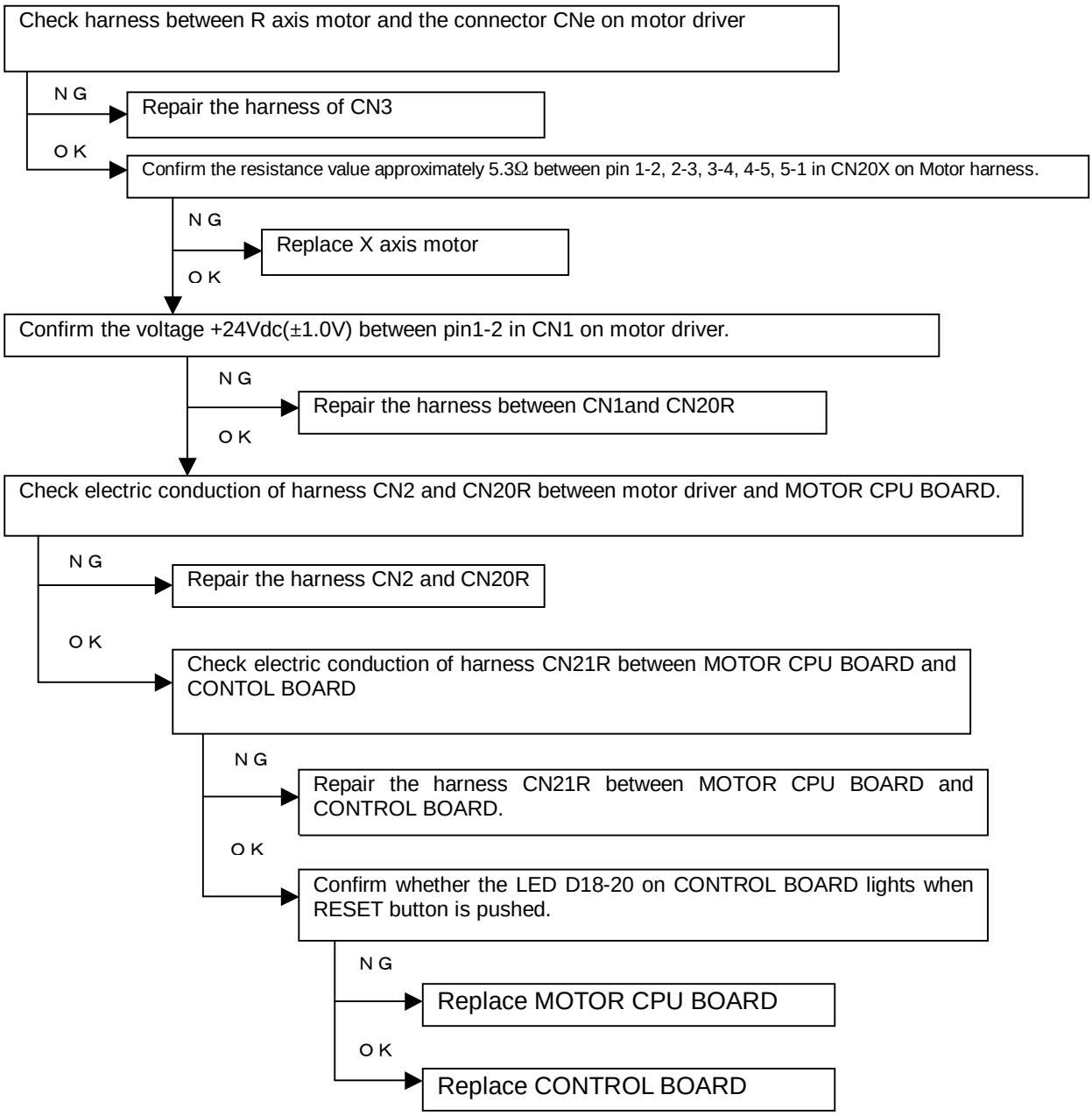

Check harness between Y axis motor and the connector CN2 on motor driver
N G
Repair the harness of CN2
O K
Confirm the resistance value approximately 5.3Ω between pin 1-2, 2-3, 3-4, 4-5, 5-1 in CN2 on Motor harness.
N G
Replace Y axis motor
O K
Confirm the voltage +24Vdc(±1.0V) between pin1-2 in CN1 on motor driver.
N G
Repair the harness between CN1and CN21Y
O K
Replace the harness CN3Y and CN3X on Y axis driver and X axis driver. And execute RESET movement.
X axis moves, and Y axis does not move.
Replace Y axis motor
Y axis moves, and X axis does not move.
Check the harness CN3Y between motor driver and MOTOR CPU BOARD.
N G
Repair the harness CN3Y.
O K
Replace MOTOR CPU BOARD

2) The abnormal sound comes out while movement of Y axis motor.

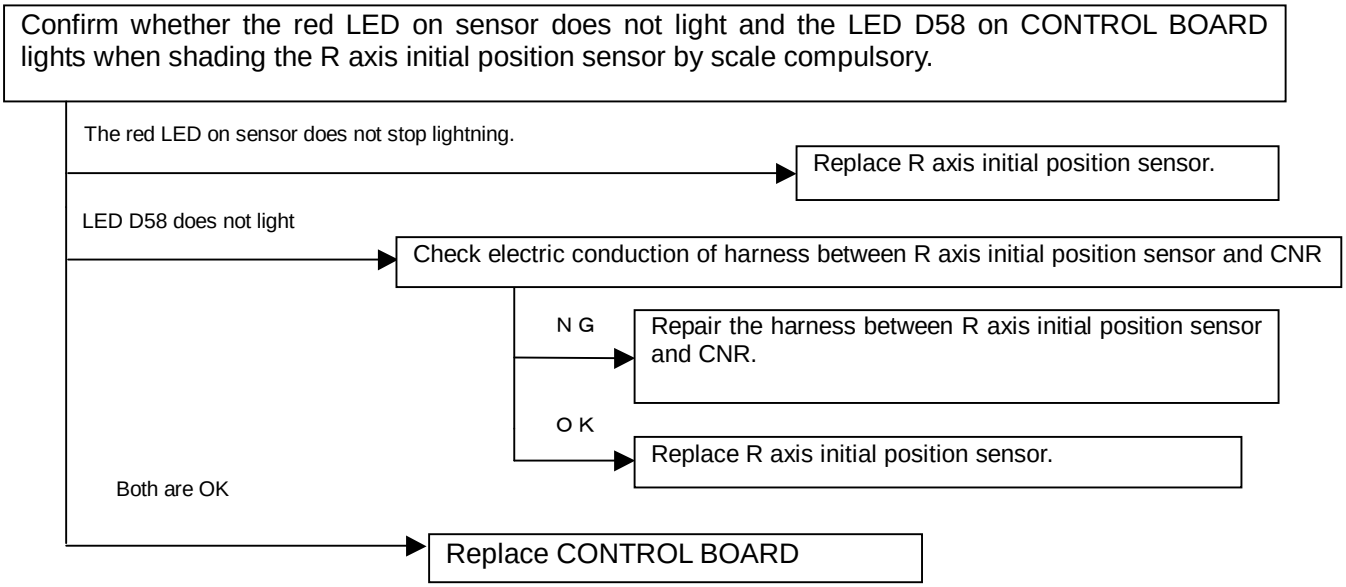

Confirm whether the red LED on sensor does not light and the LED D4 on MOTOR CPU BOARD lights when shading the Y axis initial position sensor by scale compulsory.
The red LED on sensor does not stop lightning.
Replace Y axis initial position sensor.
LED D4 does not light
Check electric conduction of harness between Y axis initial position sensor and CNSY
N G
Repair the harness between Y axis initial position sensor and CNSY.
O K
Replace Y axis initial position sensor.
Both are OK
Replace MOTOR CPU BOARD

Error Number	Error Message
203	Rotation of R motor is error. Click RESET button.

Problem：R axis motor does not move at all or the abnormal sound comes out while movement.
Corresponding
1) R axis motor does not move at all.


Check harness between R axis motor and the connector CNe on motor driver
N G
Repair the harness of CN3
O K
Confirm the resistance value approximately 5.3Ω between pin 1-2, 2-3, 3-4, 4-5, 5-1 in CN20X on Motor harness.
N G
Replace X axis motor
O K
Confirm the voltage +24Vdc(±1.0V) between pin1-2 in CN1 on motor driver.
N G
Repair the harness between CN1and CN20R
O K
Check electric conduction of harness CN2 and CN20R between motor driver and MOTOR CPU BOARD.
N G
Repair the harness CN2 and CN20R
O K
Check electric conduction of harness CN21R between MOTOR CPU BOARD and CONTOL BOARD
N G
Repair the harness CN21R between MOTOR CPU BOARD and CONTROL BOARD.
O K
Confirm whether the LED D18-20 on CONTROL BOARD lights when RESET button is pushed.
N G
Replace MOTOR CPU BOARD
O K
Replace CONTROL BOARD

2) The abnormal sound comes out while movement of R axis motor.

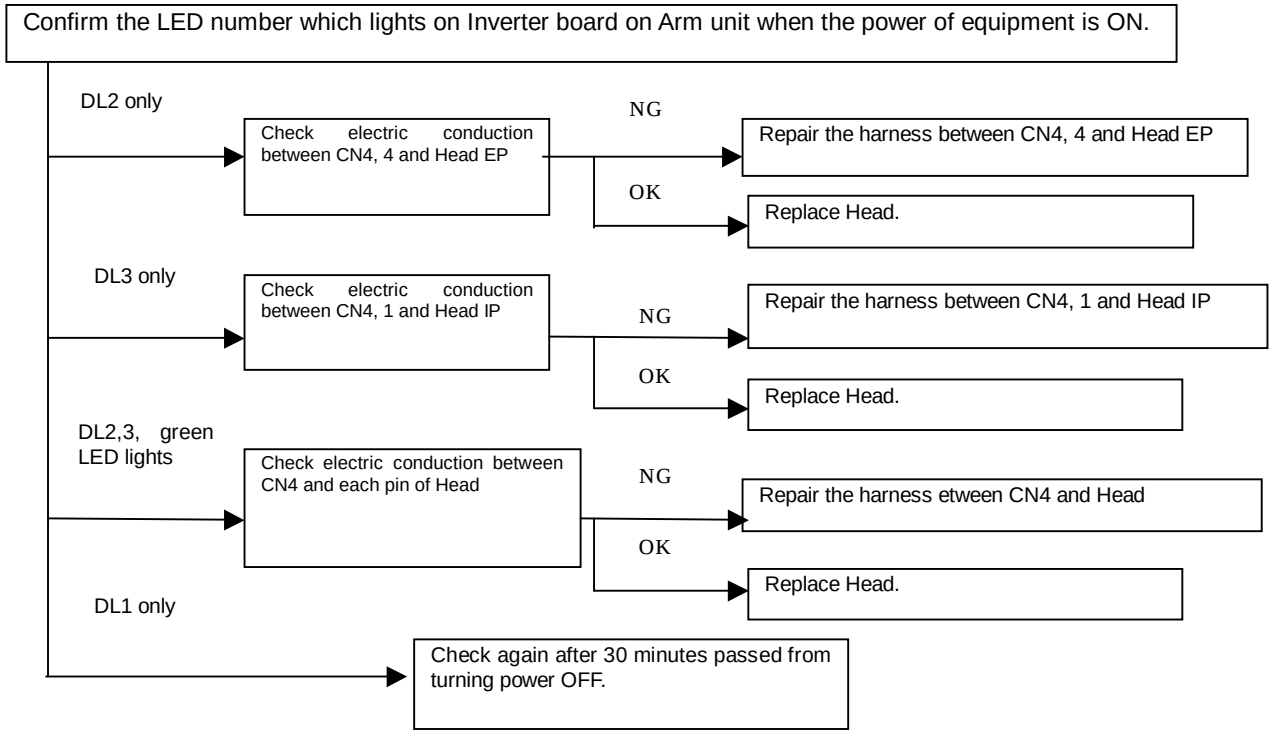

Confirm whether the red LED on sensor does not light and the LED D58 on CONTROL BOARD lights when shading the R axis initial position sensor by scale compulsory.
The red LED on sensor does not stop lightning.
Replace R axis initial position sensor.
LED D58 does not light
Check electric conduction of harness between R axis initial position sensor and CNR
N G
Repair the harness between R axis initial position sensor and CNR.
O K
Replace R axis initial position sensor.
Both are OK
Replace CONTROL BOARD

Error Number	Error Message
204	Inverter is error. Turn the power of X-ray equipment off, and then contact your agent.

Problem：Inverter error.

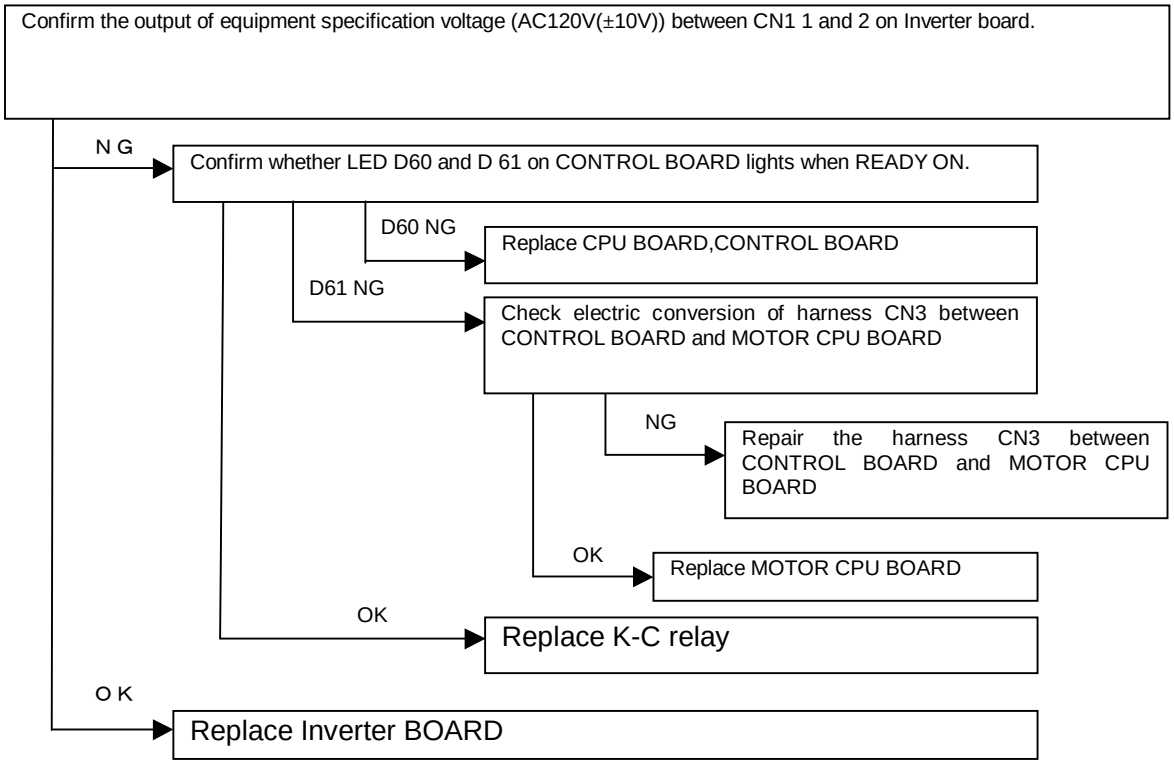
Corresponding

1) Error comes out when READY is ON.


Confirm the LED number which lights on Inverter board on Arm unit when the power of equipment is ON.
DL2 only
Check electric conduction between CN4, 4 and Head EP
NG
Repair the harness between CN4, 4 and Head EP
OK
Replace Head.
DL3 only
Check electric conduction between CN4, 1 and Head IP
NG
Repair the harness between CN4, 1 and Head IP
OK
Replace Head.
DL2,3, green LED lights
Check electric conduction between CN4 and each pin of Head
NG
Repair the harness etween CN4 and Head
OK
Replace Head.
DL1 only
Check again after 30 minutes passed from turning power OFF.

2) Error comes out when X-ray is ON.

When LED DL1 on Inverter board lights


Confirm the output of equipment specification voltage (AC120V(±10V)) between CN1 1 and 2 on Inverter board.
N G
Confirm whether LED D60 and D 61 on CONTROL BOARD lights when READY ON.
D60 NG
Replace CPU BOARD,CONTROL BOARD
D61 NG
Check electric conversion of harness CN3 between CONTROL BOARD and MOTOR CPU BOARD
NG
Repair the harness CN3 between CONTROL BOARD and MOTOR CPU BOARD
OK
Replace MOTOR CPU BOARD
OK
Replace K-C relay
O K
Replace Inverter BOARD

When LED DL2 on Inverter board lights. :
Confirm the voltage between check pin CP11 and CP5(kVref) on CONTROL BOARD.

Setting Tube Voltage	Measurement Voltage(CP11-CP5)
60kV(12mA)	3.19Vdc(±0.05)
70kV(12mA)	3.63Vdc(±0.10)
80kV(12mA)	4.09Vdc(±0.12)
90kV(12mA)	4.60Vdc(±0.13)
95kV(12mA)	4.70Vdc(±0.13)

Table 1, kVref (Voltage betweenCP11 and CP5)

If the value is different from the above value, replace CONTROL BOARD.

When LED DL3 on Inverter board lights. :
Confirm the voltage between check pin CP15 and CP5(mAref) on CONTROL BOARD.

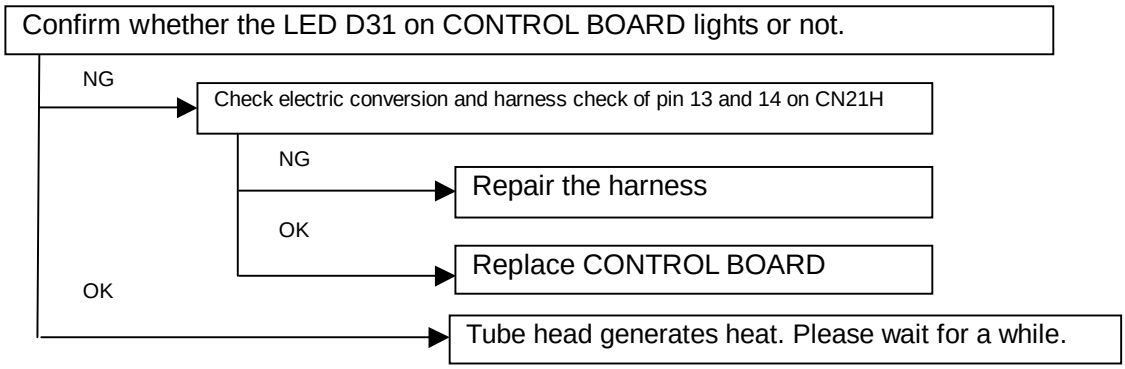
Setting Tube current	Measurement Point	Voltage
2mA	CP15-CP5	+1.0Vdc(±0.05V)
3mA		+1.5Vdc(±0.08V)
4mA		+2.0Vdc(±0.10V)
5mA		+2.5Vdc(±0.13V)
6mA		+3.0Vdc(±0.15V)
7mA		+3.5Vdc(±0.18V)
8mA		+4.0Vdc(±0.20V)
9mA		+4.5Vdc(±0.23V)
10mA		+5.0Vdc(±0.25V)
11mA		+5.5Vdc(±0.28V)
12mA		+6.0Vdc(±0.30V)

Table 2, mAref (Voltage between CP15 and CP5)

If the value is different from the above value, replace CONTROL BOARD.

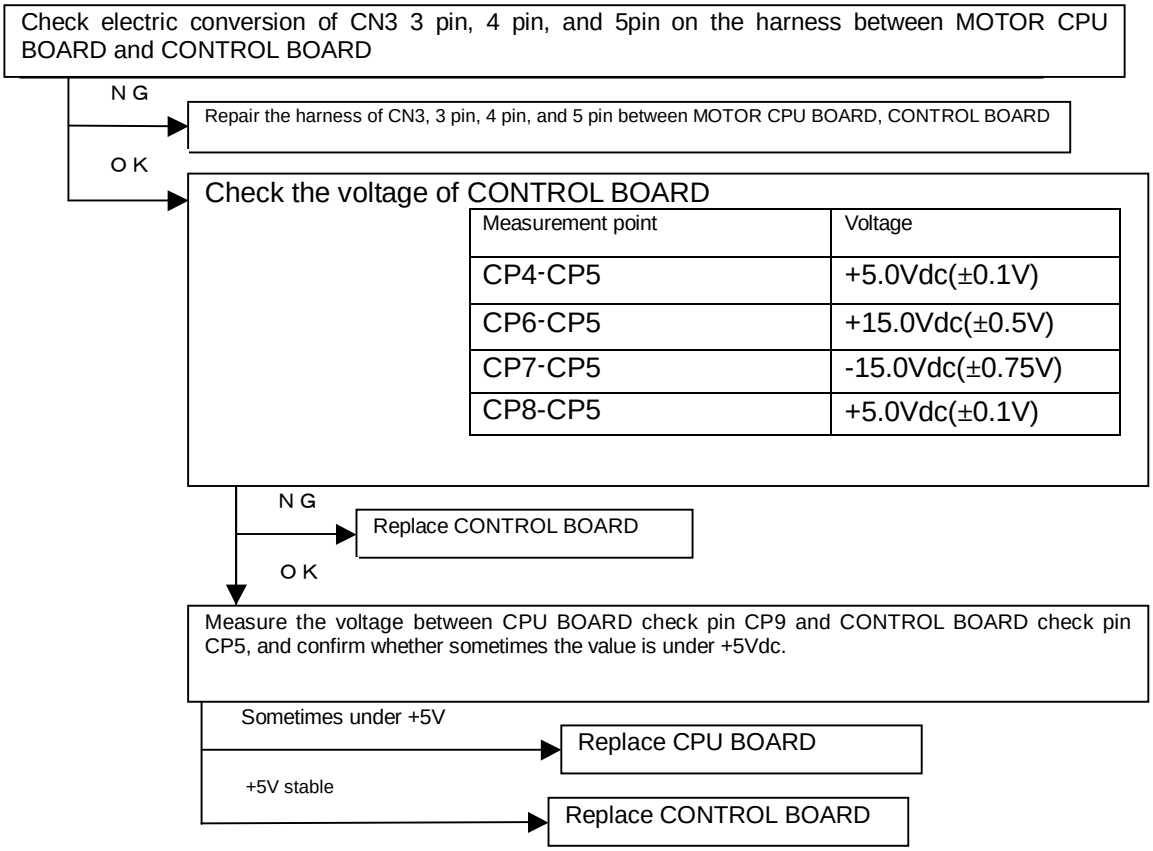
Error Number	Error Message
205	Tube temperature is error. Turn the power of X-ray equipment off, and wait for 30 minutes.

Problem : X-ray exposure is stopped for protection of tube head, or wire for detection is cut.
Corresponding


Confirm whether the LED D31 on CONTROL BOARD lights or not.
NG
Check electric conversion and harness check of pin 13 and 14 on CN21H
NG
Repair the harness
OK
Replace CONTROL BOARD
OK
Tube head generates heat. Please wait for a while.

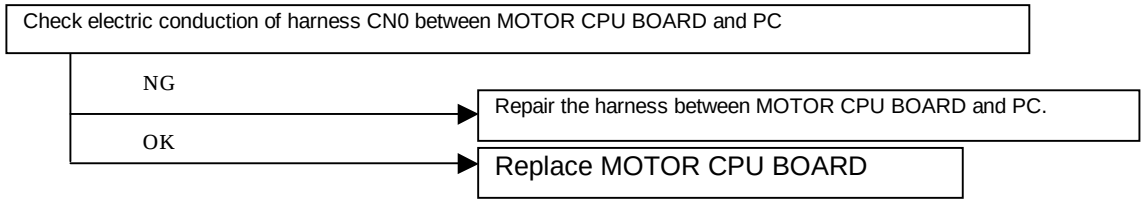
Error Number	Error Message
206	Communication between Motor CPU and Control Board is error. Turn on the power of the X-ray equipment again.

Problem：Communication error
Corresponding


Check electric conversion of CN3 3 pin, 4 pin, and 5pin on the harness between MOTOR CPU BOARD and CONTROL BOARD
N G
Repair the harness of CN3, 3 pin, 4 pin, and 5 pin between MOTOR CPU BOARD, CONTROL BOARD
O K
Check the voltage of CONTROL BOARD
Measurement point
Voltage
CP4-CP5
+5.0Vdc(±0.1V)
CP6-CP5
+15.0Vdc(±0.5V)
CP7-CP5
-15.0Vdc(±0.75V)
CP8-CP5
+5.0Vdc(±0.1V)
N G
Replace CONTROL BOARD
O K
Measure the voltage between CPU BOARD check pin CP9 and CONTROL BOARD check pin CP5, and confirm whether sometimes the value is under +5Vdc.
Sometimes under +5V
Replace CPU BOARD
+5V stable
Replace CONTROL BOARD

Error Number	Error Message
207	Communication between Motor CPU and Console computer is error. Turn on the power of the X-ray equipment again.

Problem：Communication error
Corresponding

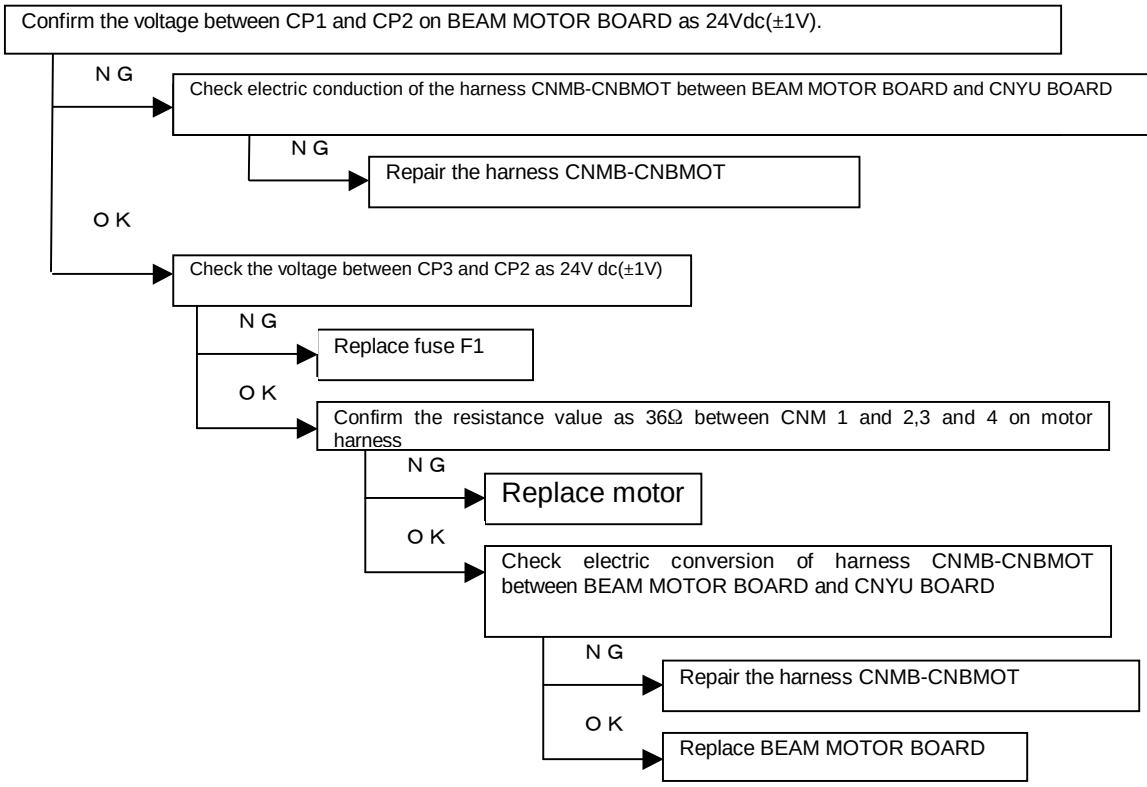

Check electric conduction of harness CN0 between MOTOR CPU BOARD and PC
NG
Repair the harness between MOTOR CPU BOARD and PC.
OK
Replace MOTOR CPU BOARD

Error Number	Error Message
211	Rotation of indicator beam motor is error. Turn on the power of the X-ray equipment again.

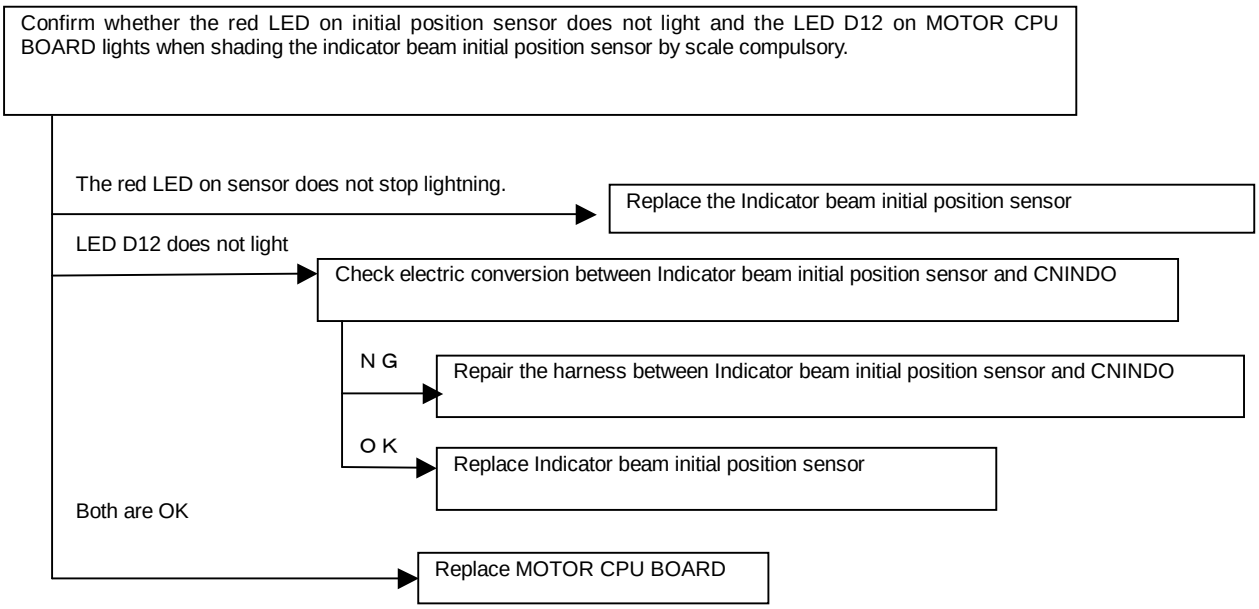
Problem：Indicator beam motor does not move, or the abnormal sound comes out while movement.

Corresponding

1) Indicator beam motor does not move.

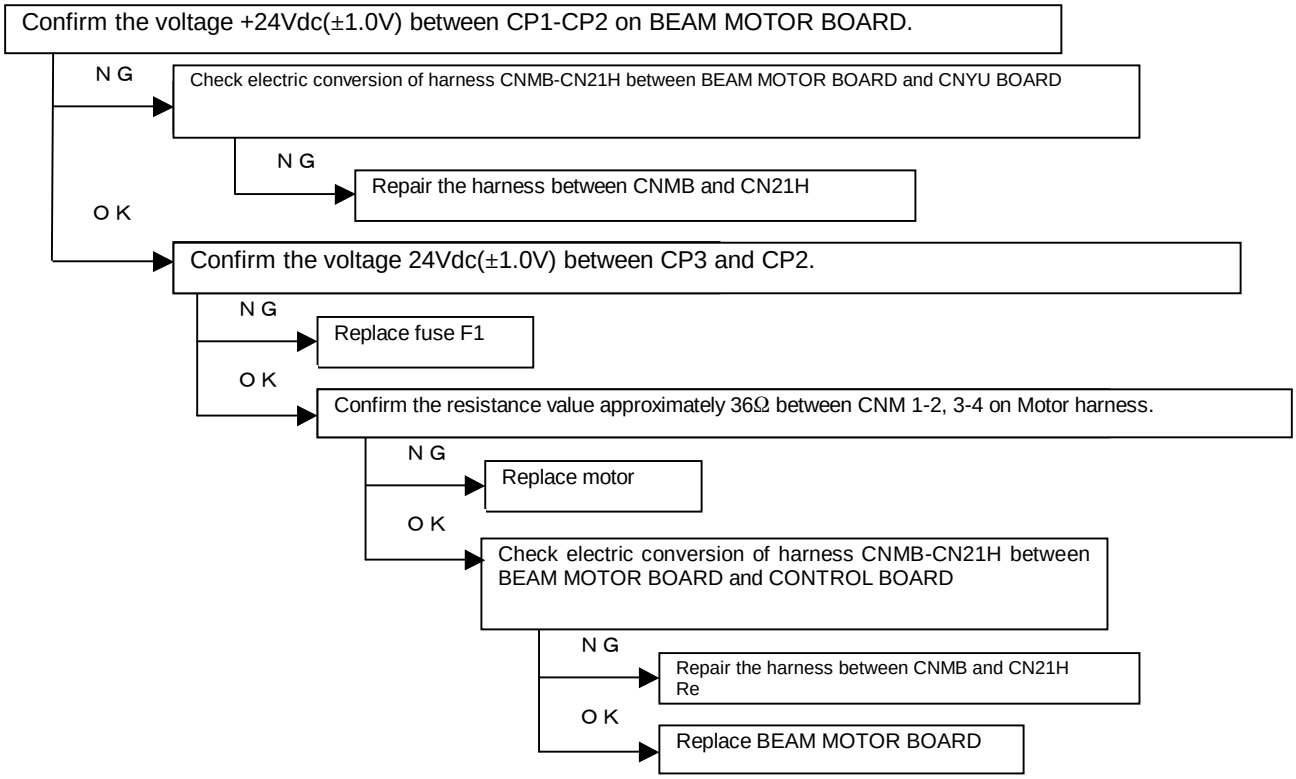

Confirm the voltage between CP1 and CP2 on BEAM MOTOR BOARD as 24Vdc(±1V).
N G
Check electric conduction of the harness CNMB-CNBMOT between BEAM MOTOR BOARD and CNYU BOARD
N G
Repair the harness CNMB-CNBMOT
O K
Check the voltage between CP3 and CP2 as 24V dc(±1V)
N G
Replace fuse F1
O K
Confirm the resistance value as 36Ω between CNM 1 and 2,3 and 4 on motor harness
N G
Replace motor
O K
Check electric conversion of harness CNMB-CNBMOT between BEAM MOTOR BOARD and CNYU BOARD
N G
Repair the harness CNMB-CNBMOT
O K
Replace BEAM MOTOR BOARD

2) The abnormal sound comes out while movement.

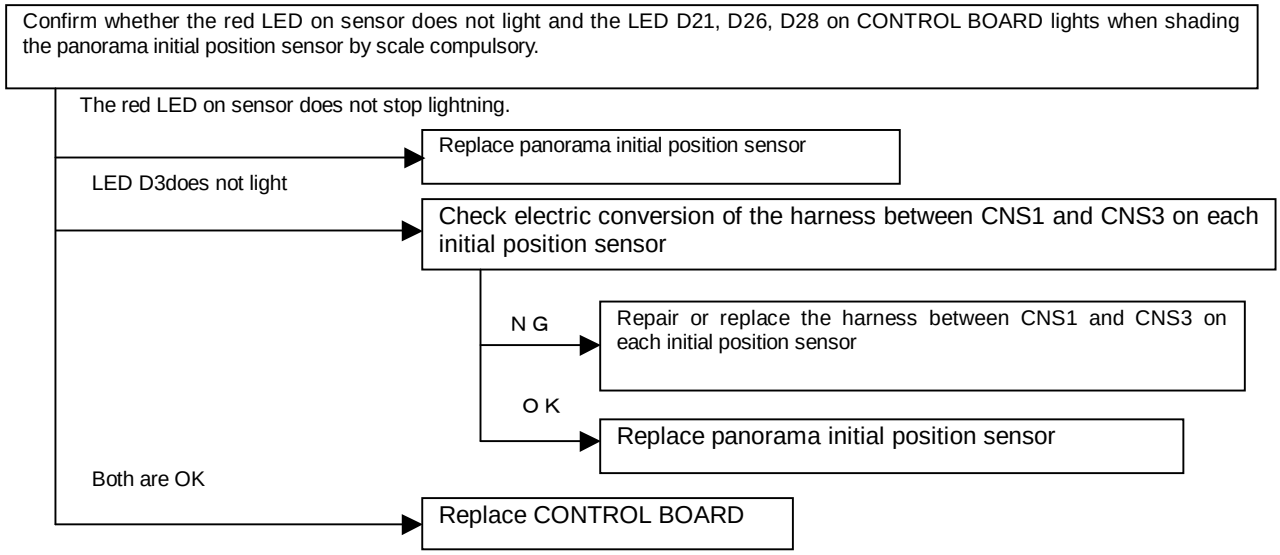

Confirm whether the red LED on initial position sensor does not light and the LED D12 on MOTOR CPU BOARD lights when shading the indicator beam initial position sensor by scale compulsory.
The red LED on sensor does not stop lightning.
Replace the Indicator beam initial position sensor
LED D12 does not light
Check electric conversion between Indicator beam initial position sensor and CNINDO
N G
Repair the harness between Indicator beam initial position sensor and CNINDO
O K
Replace Indicator beam initial position sensor
Both are OK
Replace MOTOR CPU BOARD

Error Number	Error Message
212	Collimator motor motion is error. Turn on the power of the X-ray equipment again.

Problem：The abnormal sound comes out from collimator when power is ON.
The error message is displayed when exposure mode is changed.
Collimator motor does not move at all, or the abnormal sound comes out while movement.
Corresponding
1) Collimator motor does not move at all.


Confirm the voltage +24Vdc(±1.0V) between CP1-CP2 on BEAM MOTOR BOARD.
N G
Check electric conversion of harness CNMB-CN21H between BEAM MOTOR BOARD and CNYU BOARD
N G
Repair the harness between CNMB and CN21H
O K
Confirm the voltage 24Vdc(±1.0V) between CP3 and CP2.
N G
Replace fuse F1
O K
Confirm the resistance value approximately 36Ω between CNM 1-2, 3-4 on Motor harness.
N G
Replace motor
O K
Check electric conversion of harness CNMB-CN21H between BEAM MOTOR BOARD and CONTROL BOARD
N G
Repair the harness between CNMB and CN21H
Re
O K
Replace BEAM MOTOR BOARD

2) The abnormal sound comes out while movement.

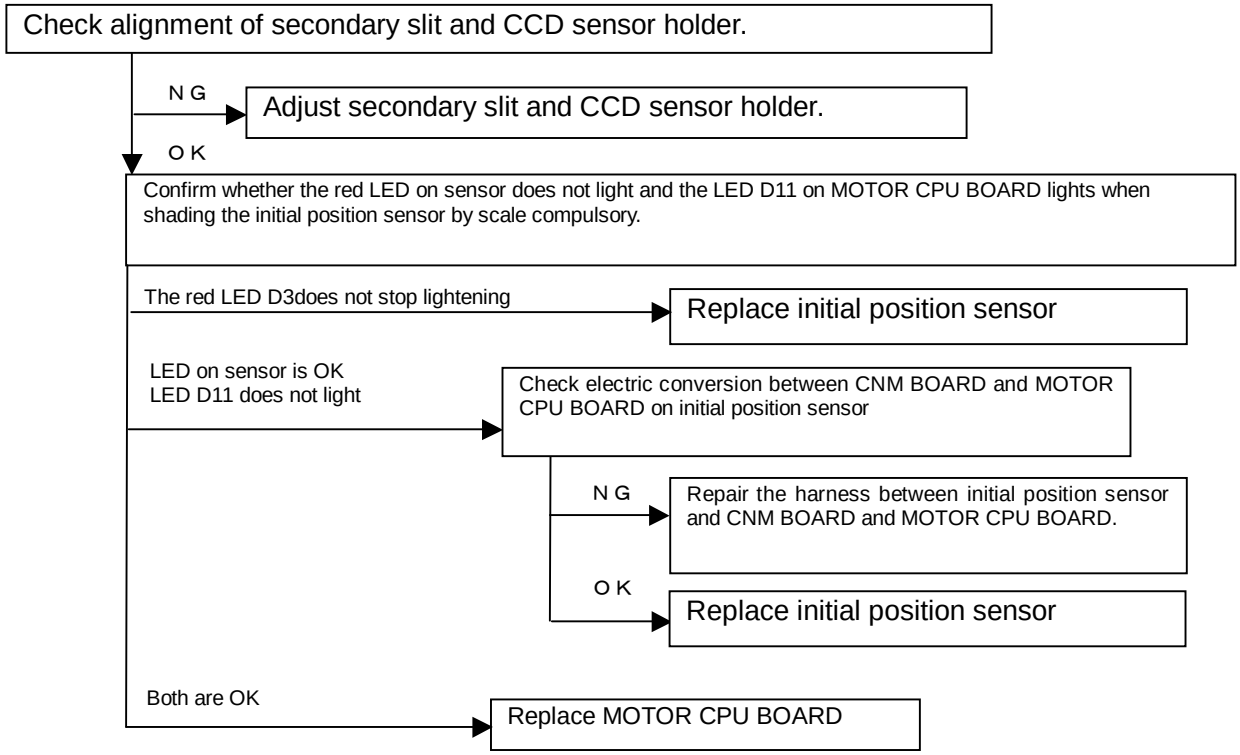

Confirm whether the red LED on sensor does not light and the LED D21, D26, D28 on CONTROL BOARD lights when shading the panorama initial position sensor by scale compulsory.
The red LED on sensor does not stop lightning.
Replace panorama initial position sensor
LED D3does not light
Check electric conversion of the harness between CNS1 and CNS3 on each initial position sensor
N G
Repair or replace the harness between CNS1 and CNS3 on each initial position sensor
O K
Replace panorama initial position sensor
Both are OK
Replace CONTROL BOARD

Error Number	Error Message
215	Movement of cephalometric motor is error. Click RESET button.

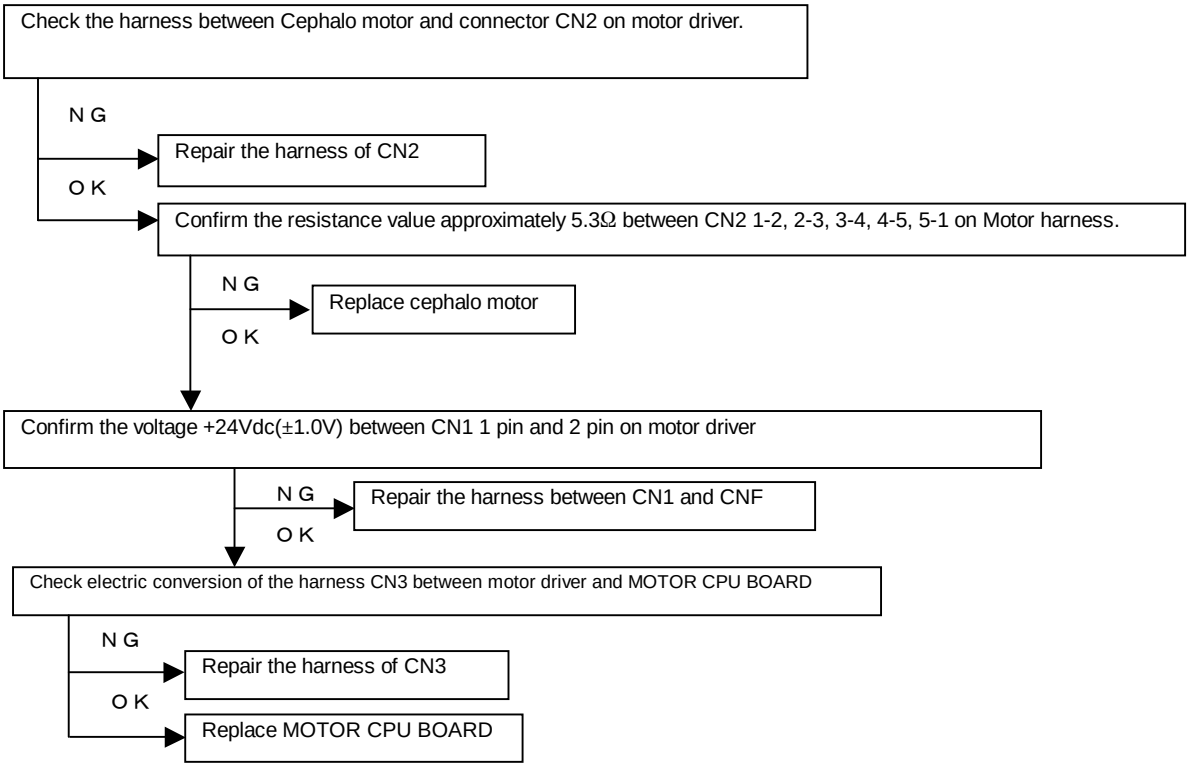
Problem：Cephalometric can not go back to the initial position. Cephalometric motor does not move at all, or the abnormal sound comes out while movement.

Corresponding

1) The abnormal sound comes out while movement.


Check alignment of secondary slit and CCD sensor holder.
N G
Adjust secondary slit and CCD sensor holder.
O K
Confirm whether the red LED on sensor does not light and the LED D11 on MOTOR CPU BOARD lights when shading the initial position sensor by scale compulsory.
The red LED D3does not stop lightening
Replace initial position sensor
LED on sensor is OK
LED D11 does not light
Check electric conversion between CNM BOARD and MOTOR CPU BOARD on initial position sensor
N G
Repair the harness between initial position sensor and CNM BOARD and MOTOR CPU BOARD.
O K
Replace initial position sensor
Both are OK
Replace MOTOR CPU BOARD

2) Motor does not move at all.


Check the harness between Cephalo motor and connector CN2 on motor driver.
N G
Repair the harness of CN2
O K
Confirm the resistance value approximately 5.3Ω between CN2 1-2, 2-3, 3-4, 4-5, 5-1 on Motor harness.
N G
Replace cephalo motor
O K
Confirm the voltage +24Vdc(±1.0V) between CN1 1 pin and 2 pin on motor driver
N G
Repair the harness between CN1 and CNF
O K
Check electric conversion of the harness CN3 between motor driver and MOTOR CPU BOARD
N G
Repair the harness of CN3
O K
Replace MOTOR CPU BOARD

Error Number	Error Message
216	Movement of head swing motor is error. Turn on the power of the X-ray equipment again.

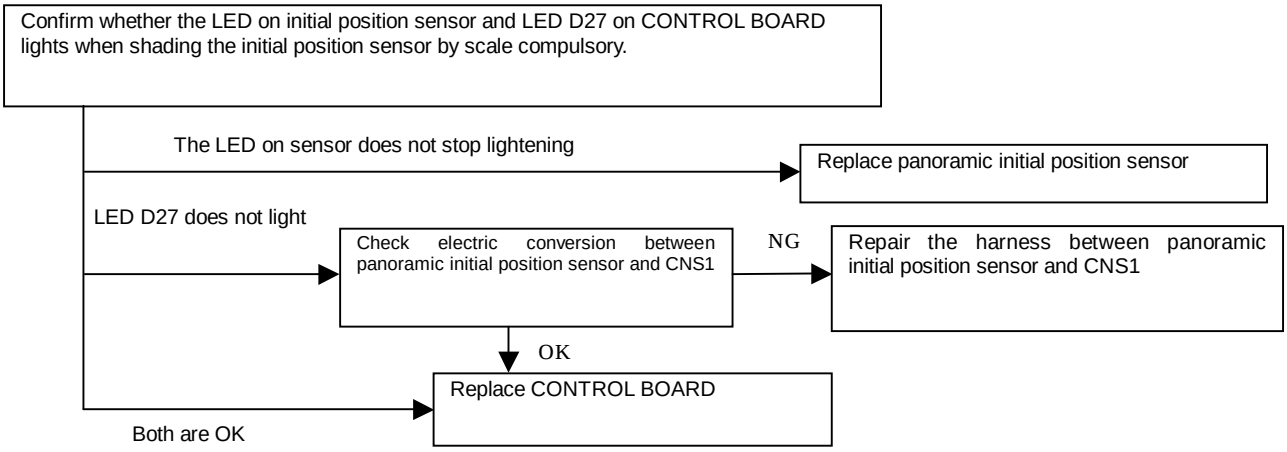
Problem：Head rotation motor movement error

Head moves in order to check the panoramic initial position, but can not detect the initial position.

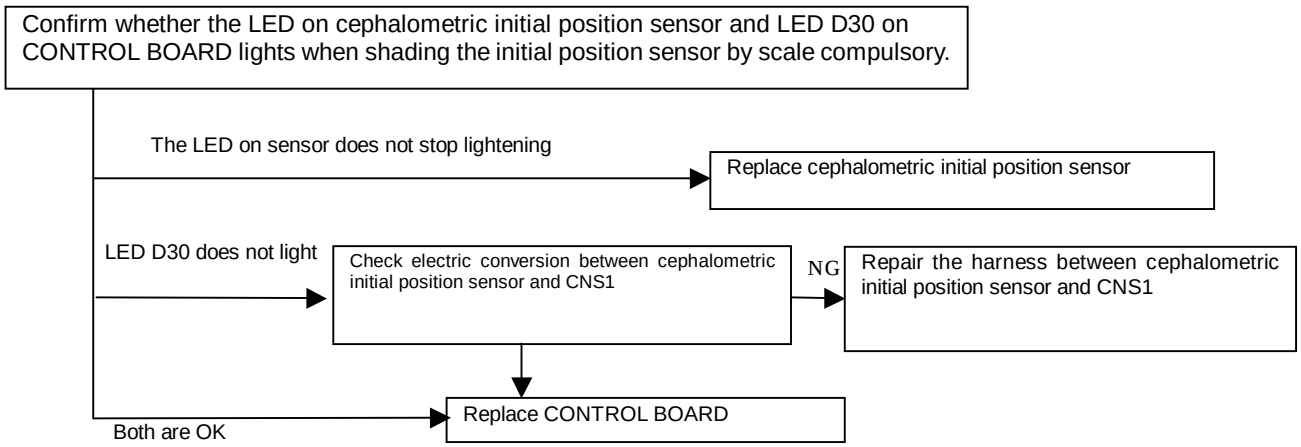
Corresponding

1) Head can rotates.

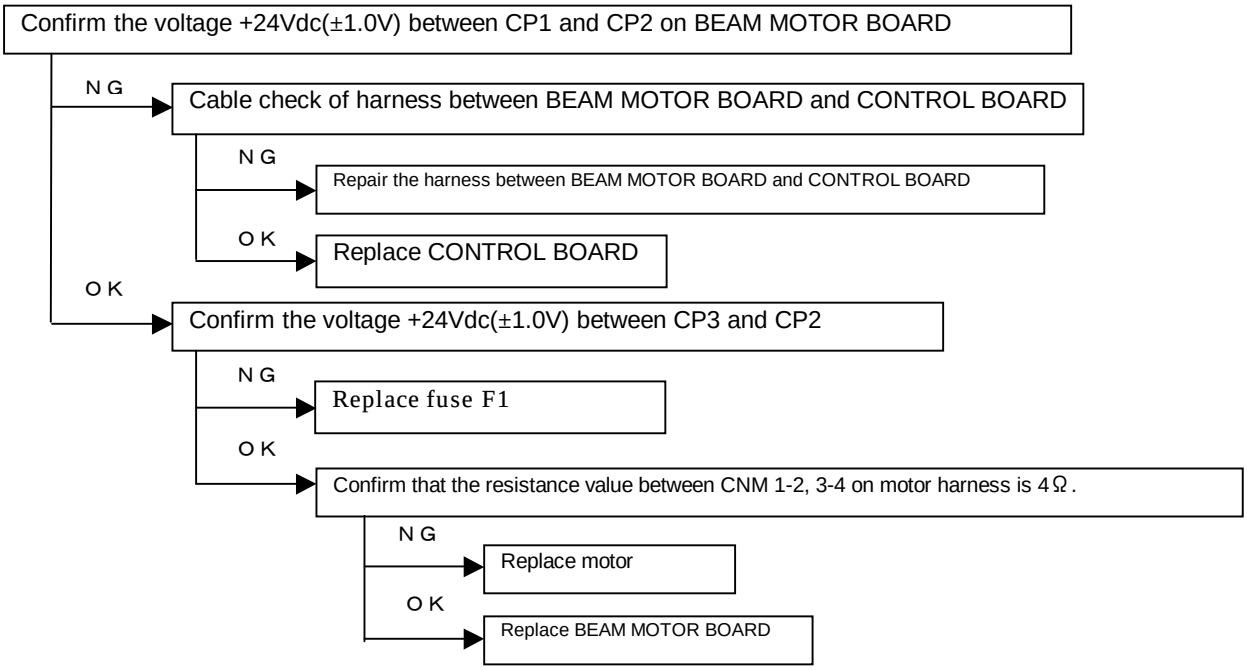
The error occurs when the position of the head is on panoramic side.


Confirm whether the LED on initial position sensor and LED D27 on CONTROL BOARD lights when shading the initial position sensor by scale compulsory.
The LED on sensor does not stop lightening
Replace panoramic initial position sensor
LED D27 does not light
Check electric conversion between panoramic initial position sensor and CNS1
NG
Repair the harness between panoramic initial position sensor and CNS1
OK
Replace CONTROL BOARD
Both are OK

The error occurs when the position of the head is on cephalometric side.

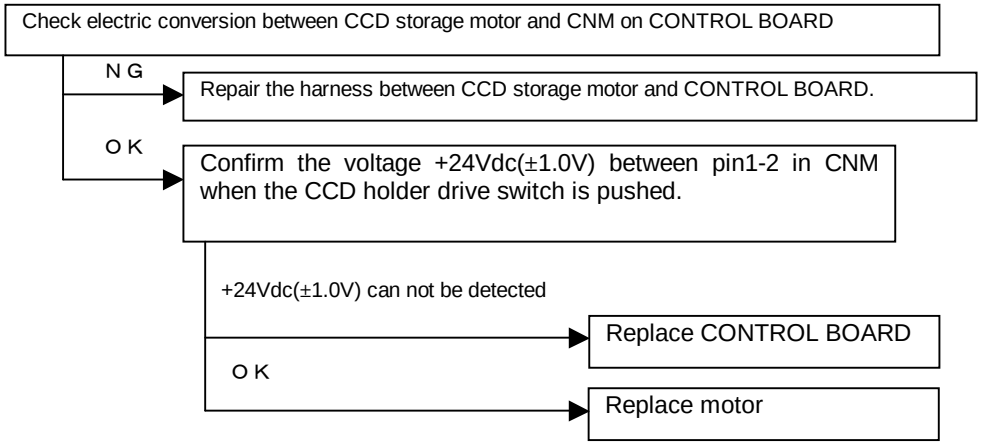

Confirm whether the LED on cephalometric initial position sensor and LED D30 on CONTROL BOARD lights when shading the initial position sensor by scale compulsory.
The LED on sensor does not stop lightening
Replace cephalometric initial position sensor
LED D30 does not light
Check electric conversion between cephalometric initial position sensor and CNS1
NG
Repair the harness between cephalometric initial position sensor and CNS1
Replace CONTROL BOARD
Both are OK

2) Head does not rotate.

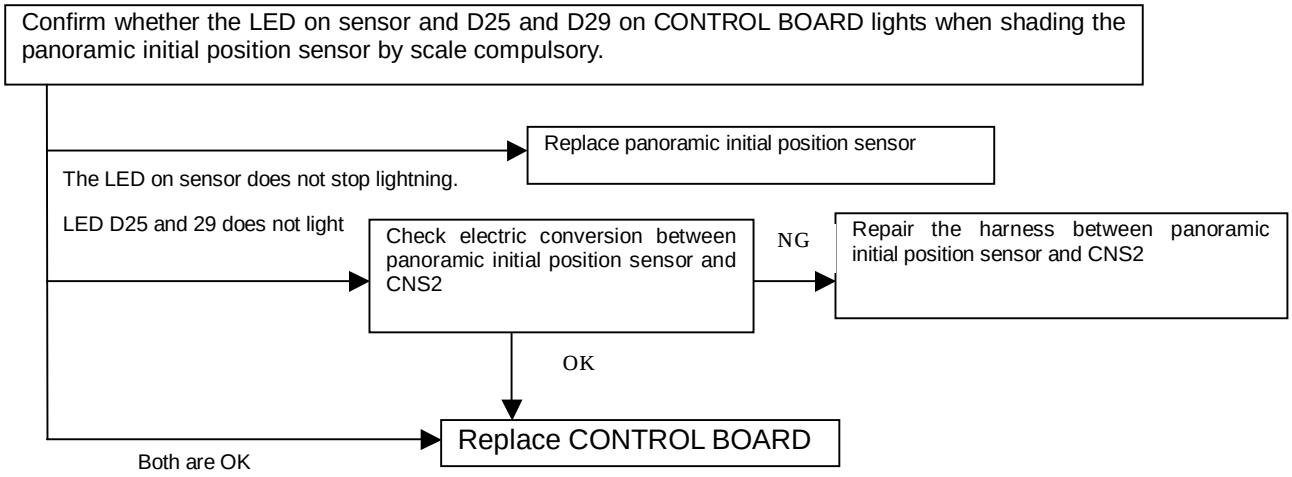

Confirm the voltage +24Vdc(±1.0V) between CP1 and CP2 on BEAM MOTOR BOARD
N G
Cable check of harness between BEAM MOTOR BOARD and CONTROL BOARD
N G
Repair the harness between BEAM MOTOR BOARD and CONTROL BOARD
O K
Replace CONTROL BOARD
O K
Confirm the voltage +24Vdc(±1.0V) between CP3 and CP2
N G
Replace fuse F1
O K
Confirm that the resistance value between CNM 1-2, 3-4 on motor harness is 4Ω.
N G
Replace motor
O K
Replace BEAM MOTOR BOARD

Error Number	Error Message
217	Movement of CCD placement motor is error. Push Drive Switch of CCD holder.

Problem：CCD storage motor does not move at all.
Corresponding
1) When the Motor does not move at all

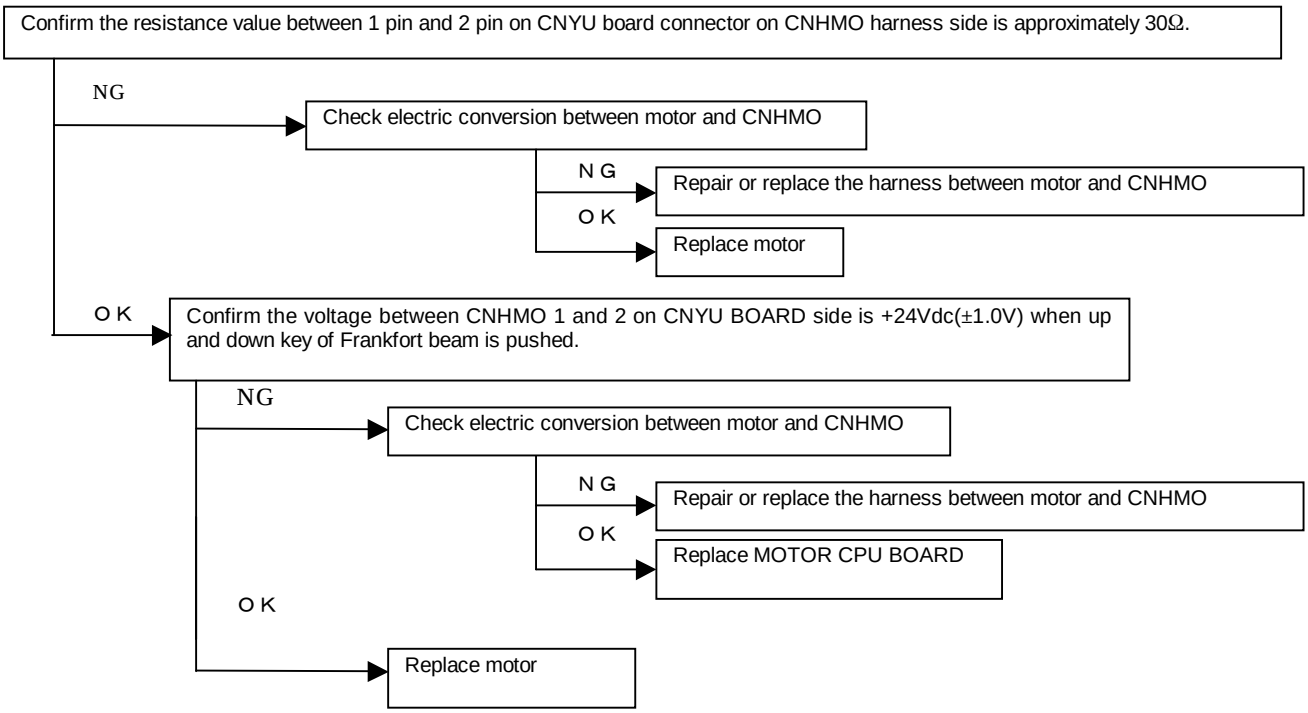

Check electric conversion between CCD storage motor and CNM on CONTROL BOARD
N G
Repair the harness between CCD storage motor and CONTROL BOARD.
O K
Confirm the voltage +24Vdc(±1.0V) between pin1-2 in CNM when the CCD holder drive switch is pushed.
+24Vdc(±1.0V) can not be detected
Replace CONTROL BOARD
O K
Replace motor

2) When the Motor is working


Confirm whether the LED on sensor and D25 and D29 on CONTROL BOARD lights when shading the panoramic initial position sensor by scale compulsory.
Replace panoramic initial position sensor
The LED on sensor does not stop lightning.
LED D25 and 29 does not light
Check electric conversion between panoramic initial position sensor and CNS2
NG
Repair the harness between panoramic initial position sensor and CNS2
OK
Replace CONTROL BOARD
Both are OK

Error Number	Error Message
218	Movement of flat beam motor is error. Turn on the power of the X-ray equipment again..

Problem：Frankfort beam does not move at all.
Corresponding
Motor does not move at all.

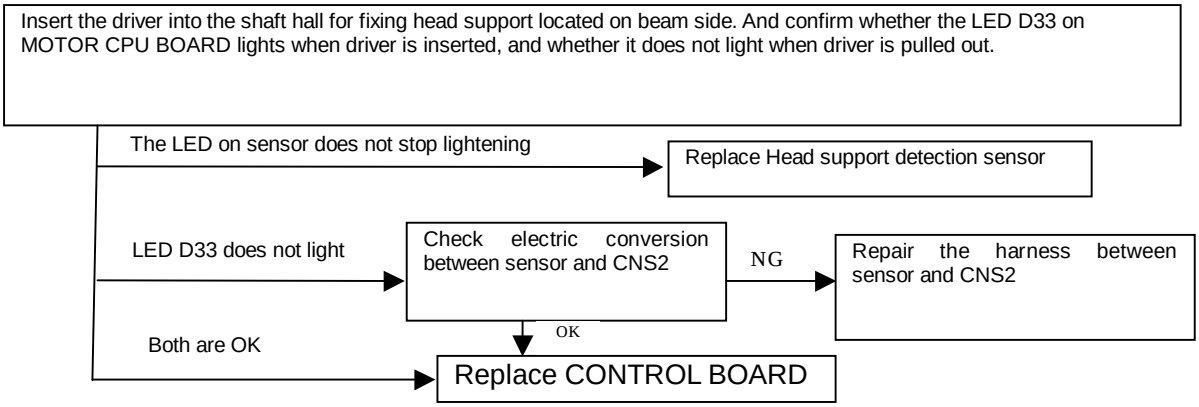

Confirm the resistance value between 1 pin and 2 pin on CNYU board connector on CNHMO harness side is approximately 30Ω.
NG
Check electric conversion between motor and CNHMO
N G
Repair or replace the harness between motor and CNHMO
O K
Replace motor
O K
Confirm the voltage between CNHMO 1 and 2 on CNYU BOARD side is +24Vdc(±1.0V) when up and down key of Frankfort beam is pushed.
NG
Check electric conversion between motor and CNHMO
N G
Repair or replace the harness between motor and CNHMO
O K
Replace MOTOR CPU BOARD
O K
Replace motor

Error Number	Error Message
219	Something is wrong with EEPROM. Turn on the power of the X-ray equipment again.

Procedure
If the problem can not be improved, replace CONTROL BOARD.

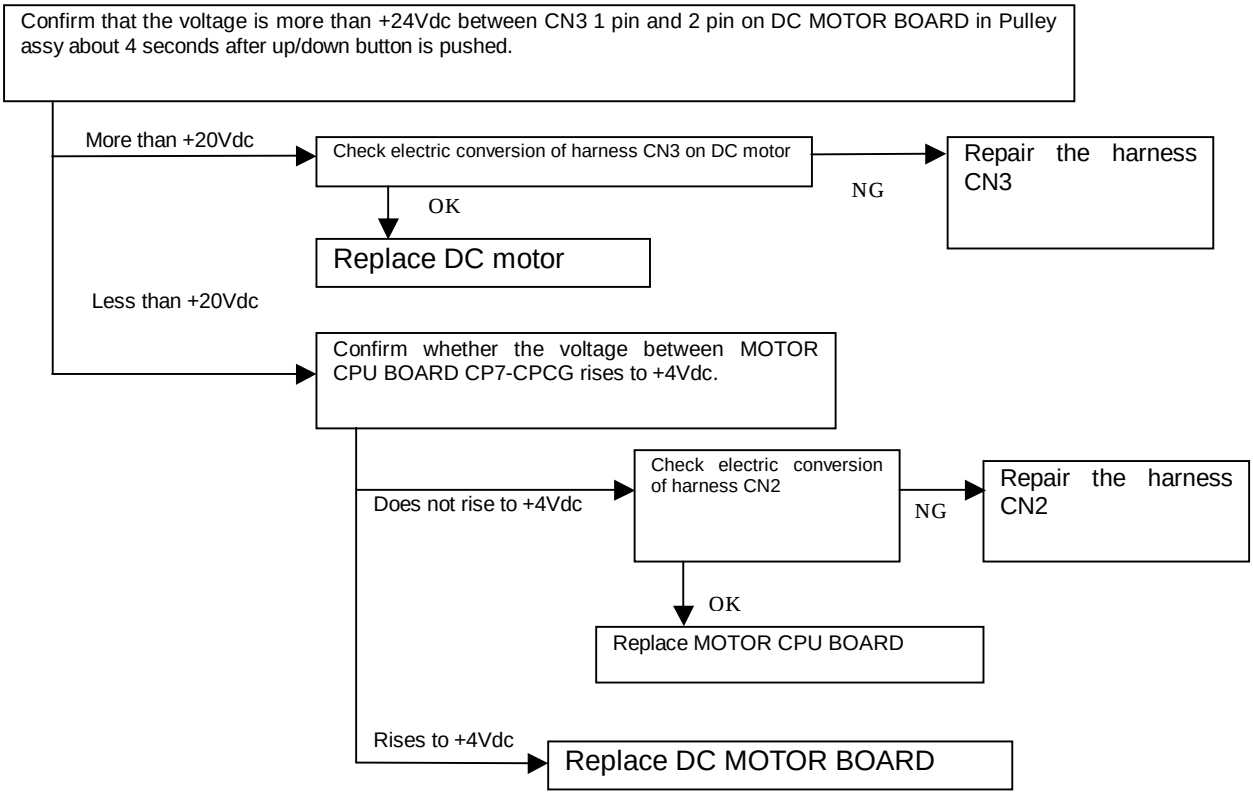
Error Number	Error Message
220	Take head support off.

Problem：The error of Head support detection sensor
Corresponding

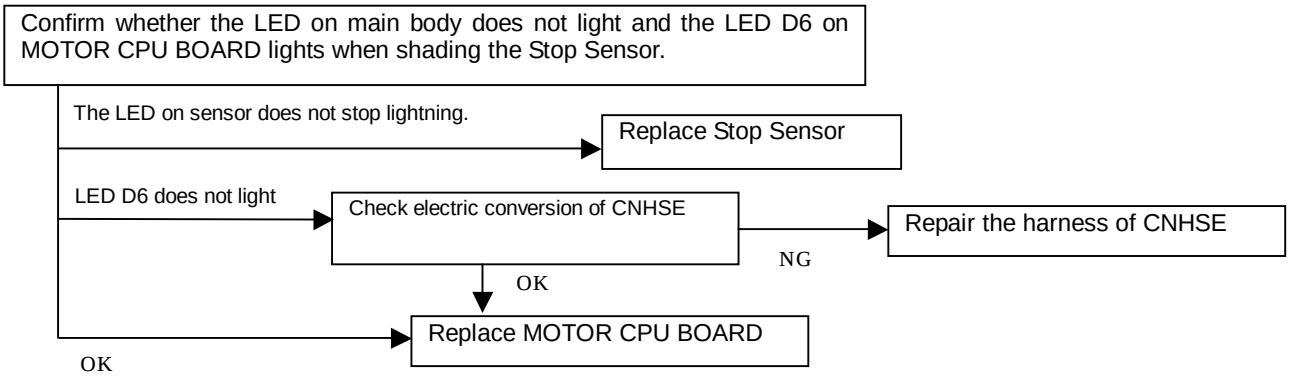

Insert the driver into the shaft hall for fixing head support located on beam side. And confirm whether the LED D33 on MOTOR CPU BOARD lights when driver is inserted, and whether it does not light when driver is pulled out.
The LED on sensor does not stop lightening
Replace Head support detection sensor
LED D33 does not light
Check electric conversion between sensor and CNS2
NG
Repair the harness between sensor and CNS2
OK
Both are OK
Replace CONTROL BOARD

Error Number	Error Message
222	Sliding unit is error. Turn on the power of the X-ray equipment again.

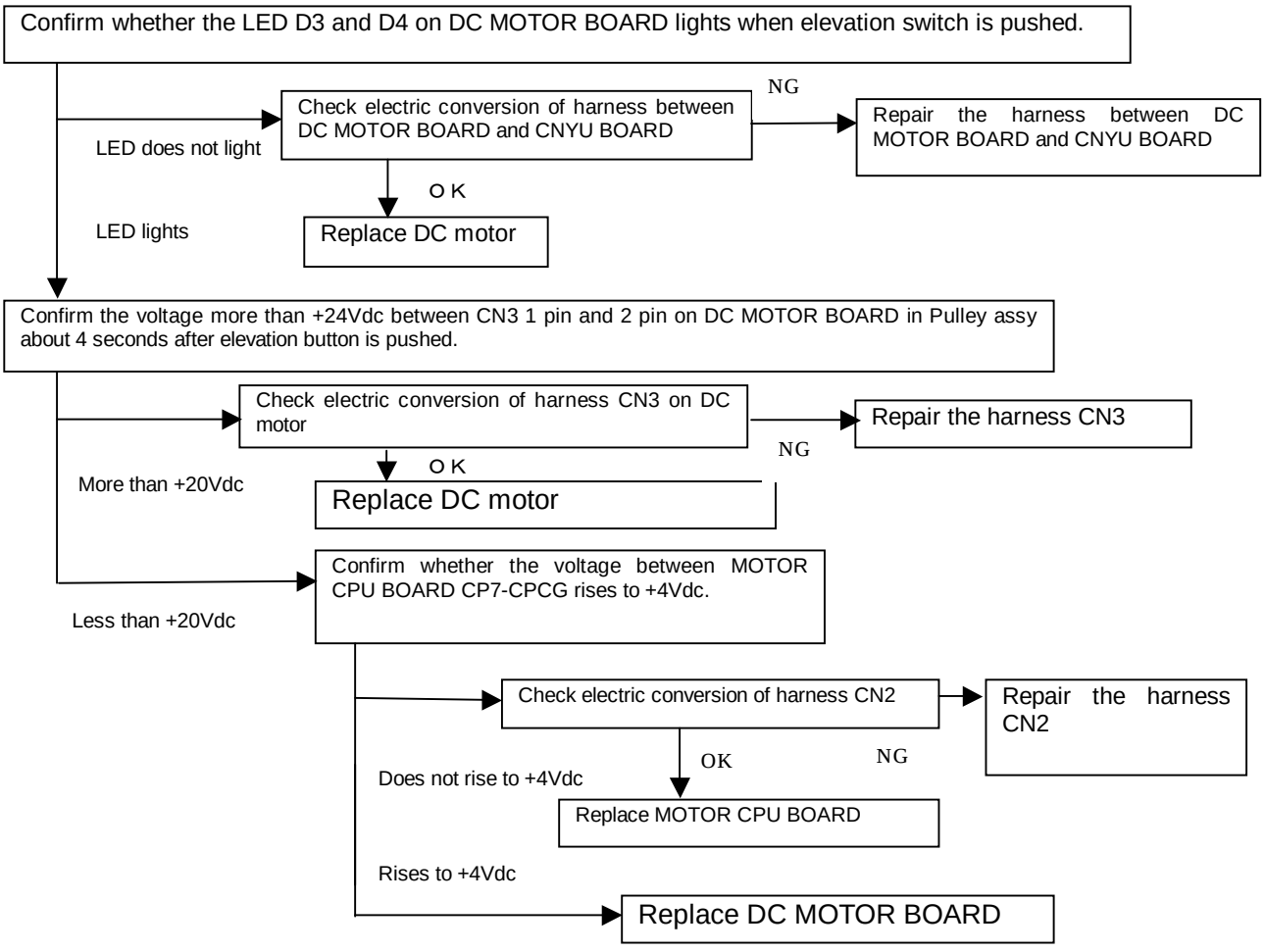
Problem：The sensor cannot be detected even if it moves during the fixed time.
Corresponding
Sliding unit moves up/down.


Confirm that the voltage is more than +24Vdc between CN3 1 pin and 2 pin on DC MOTOR BOARD in Pulley assy about 4 seconds after up/down button is pushed.
More than +20Vdc
Check electric conversion of harness CN3 on DC motor
NG
Repair the harness CN3
OK
Replace DC motor
Less than +20Vdc
Confirm whether the voltage between MOTOR CPU BOARD CP7-CPCG rises to +4Vdc.
Check electric conversion of harness CN2
Does not rise to +4Vdc
NG
Repair the harness CN2
OK
Replace MOTOR CPU BOARD
Rises to +4Vdc
Replace DC MOTOR BOARD

Sliding Unit does not move up/down（key cancel sound comes out）.

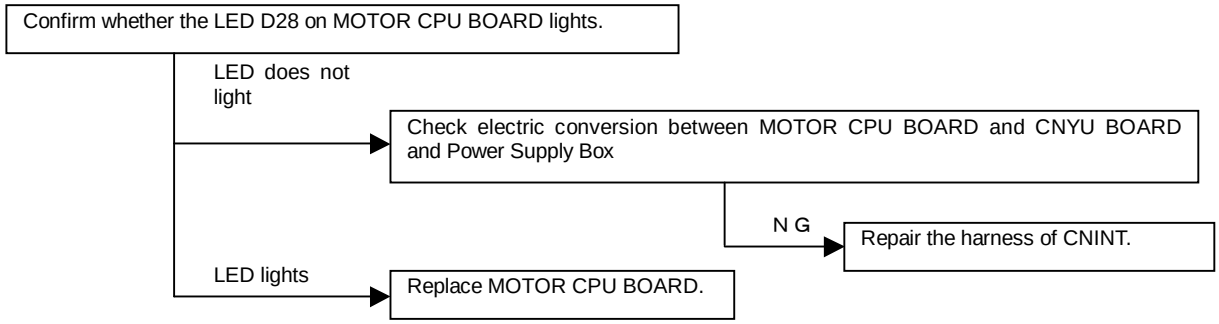

Confirm whether the LED on main body does not light and the LED D6 on MOTOR CPU BOARD lights when shading the Stop Sensor.
The LED on sensor does not stop lightning.
Replace Stop Sensor
LED D6 does not light
Check electric conversion of CNHSE
Repair the harness of CNHSE
NG
OK
Replace MOTOR CPU BOARD
OK

Sliding Unit does not move up/down（key cancel sound does not come out）.


Confirm whether the LED D3 and D4 on DC MOTOR BOARD lights when elevation switch is pushed.
NG
Check electric conversion of harness between DC MOTOR BOARD and CNYU BOARD
Repair the harness between DC MOTOR BOARD and CNYU BOARD
LED does not light
O K
LED lights
Replace DC motor
Confirm the voltage more than +24Vdc between CN3 1 pin and 2 pin on DC MOTOR BOARD in Pulley assy about 4 seconds after elevation button is pushed.
Check electric conversion of harness CN3 on DC motor
Repair the harness CN3
NG
O K
More than +20Vdc
Replace DC motor
Confirm whether the voltage between MOTOR CPU BOARD CP7-CPCG rises to +4Vdc.
Less than +20Vdc
Check electric conversion of harness CN2
Repair the harness CN2
OK
NG
Does not rise to +4Vdc
Replace MOTOR CPU BOARD
Rises to +4Vdc
Replace DC MOTOR BOARD

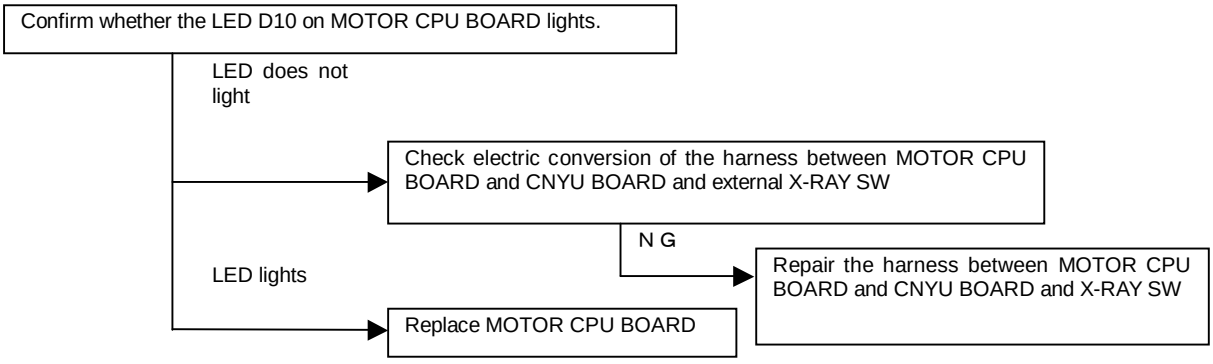
Error Number	Error Message
223	Now interlock works. Interlocking is fuctioning.

Problem：The interlock circuit is open.
Corresponding

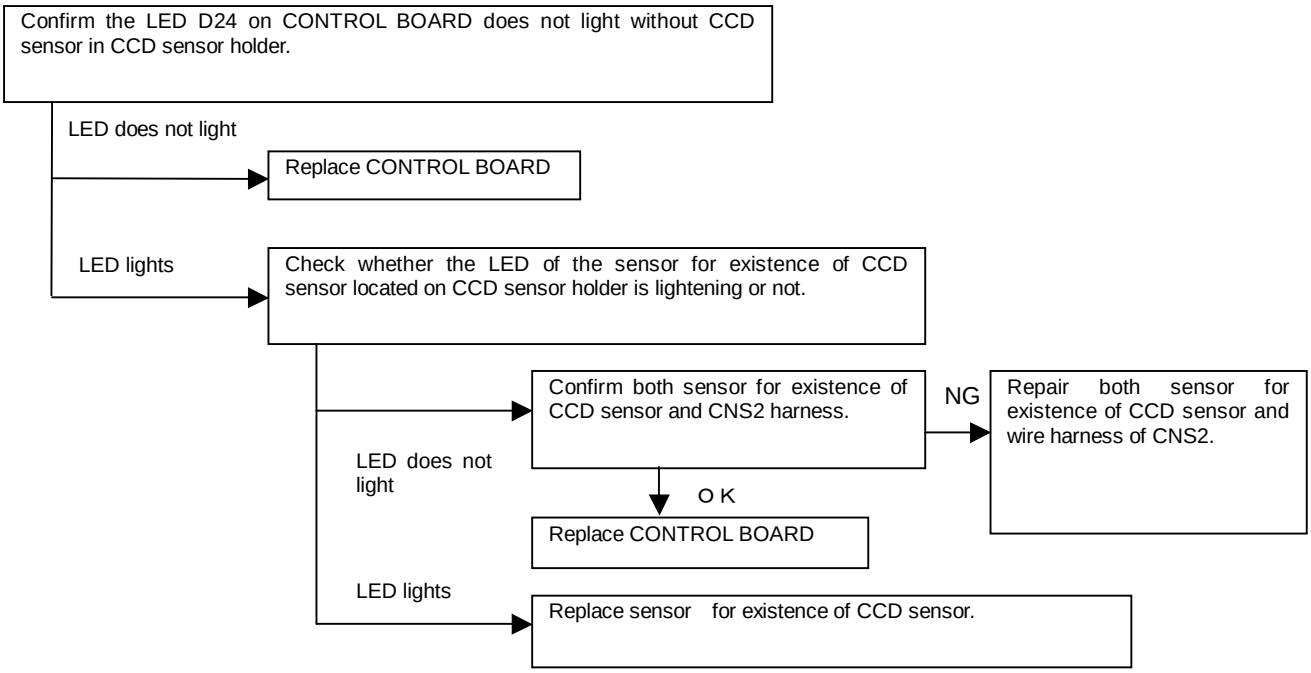

Confirm whether the LED D28 on MOTOR CPU BOARD lights.
LED does not light
Check electric conversion between MOTOR CPU BOARD and CNYU BOARD and Power Supply Box
N G
Repair the harness of CNINT.
LED lights
Replace MOTOR CPU BOARD.

Error Number	Error Message
224	X-Ray switch is error. Release X-ray Exposure switch, and click READY.

Problem：READY ON button is pushed while X-ray switch is pushed.
Corresponding


Confirm whether the LED D10 on MOTOR CPU BOARD lights.
LED does not light
Check electric conversion of the harness between MOTOR CPU BOARD and CNYU BOARD and external X-RAY SW
N G
Repair the harness between MOTOR CPU BOARD and CNYU BOARD and X-RAY SW
LED lights
Replace MOTOR CPU BOARD

・The message ”Pull out the CCD sensor” comes out, and CT exposure cannot be executed.


Confirm the LED D24 on CONTROL BOARD does not light without CCD sensor in CCD sensor holder.
LED does not light
Replace CONTROL BOARD
LED lights
Check whether the LED of the sensor for existence of CCD sensor located on CCD sensor holder is lightening or not.
Confirm both sensor for existence of CCD sensor and CNS2 harness.
NG
Repair both sensor for existence of CCD sensor and wire harness of CNS2.
LED does not light
O K
Replace CONTROL BOARD
LED lights
Replace sensor for existence of CCD sensor.

・The vertical line appears on Cephalometric image.

1）Confirm whether the exposure area is aligned on the center of cephalometric CCD when X-ray exposure.

If the exposure area is not aligned on the center, adjust the secondary slit in accordance with adjustment manual.

（FPD Error Message）

Error Number	Error Message	Corresponding
301	Communication Error	1．Turn the power of the equipment OFF and ON. 2．Check whether the communication between FPD and the equipment can be made and the images can be read with ViVa.（Refer to the below procedure） 3．If the image cannot be obtained with the working in the above item 2， Check the connection between the equipment and the PC. Where to check for the connection Is shown as below. Check one by one and make the working in Item 2. 1) Pull out and inspect LAN cable "FPDPA" "FPDCE" behind of PC. 2) Pull out and inspect LAN cable “FPDPA” and “FPDCE” on switching box behind of the equipment. 3) Remove the back cover of image detector, and pull out and inspect LAN cable for Pleora on the center. 4) Remove the Rest unit cover and Sliding unit cover, and pull out and inspect LAN connector “FPDPA” and “FPDCE” at the right of Sliding unit internal.
302	State Error	
303	Initialization error OR Device not open	
319	Video Not Initialized	
330	Timed out	
354	Unhandled exception in dll	
383	Pleora Error	
384	Frame Grabber Initialization Error	
385	Frame Grabber Error	
386	Error Starting Grabber	
387	Error Stopping Grabber	
388	Error Starting Record Sequence	
389	Error Stopping Record Sequence	
390	Error Communicating With Frame Grabber	
405	Receptor Not Ready	
462	set user sync error.	
466	close link error.	
467	LAN link time out error.	
468	RS232C link time out error.	
470	Sync check error.	

The image capture procedure with VIVA

1. Attach Chinrest for CT to the rest unit at the highest position.
2. Capture the image with VIVA.

Start menu on ＰＣ>Program>Varian>PaxscanL05>Open “VIVA” with VIVA. → Push “Offset Calib” on tool bar(It is necessary when VIVA is started.）→ Push the icon of「●」on vertical tool bar on right side of the screen. → Set the number of capture image sheets as “10” from Video menu. → Drag the thumbnail image on the upper column of the screen to the image display frame on lower column with a mouse. → Open「AUGE TEST MODE SOFT」from C:¥NEOPREMIUM¥Calibration¥ → 「Exposure(X)」 → 「Exposure mode／I mode CT」 →Take off the check of 0kV. → 「Tube voltage, Tube current, Exposure Time／60kV 2mA 8.5sec」「Exposure area/Median」 →「Exposure」→ The equipment goes to the initial position･･･「OK」→ Make the exposure status as READY. Click OK button.･･･「Cancel」 → 「Exposure(X)」 → 「Exposure mode／Half orbit」 → 「Exposure」 → The equipment goes to the initial position･･･「OK」→Make the exposure status as READY. Click OK button.･･･「OK」 → The exposure is ready.･･･Push 「X-RAY SW ON」 until the equipment stops. → 「Exposure(X)」→「Exposure mode／Test mode」 → Tube voltage, Tube current, Exposure Time／60kV 2mA 8.5sec」→「Exposure」→Make the exposure status as READY. Click OK button.･･･「OK」→ The exposure is ready･･･Push the icon of 「■」on vertical tool bar on right side of the screen while X-ray is emitted using「X-RAY SW ON」 → The image of the chinrest is displayed.→ Push 「cancel」 on the displayed window. →「OK」

(CCD Error Message)

Error Number	Error Message	Corresponding
501	Status of Circuit Setting at Initialization Time was changed.	Confirm the sensor connection status, confirm the power supply of the device, improve the communication environment, close the exposure panel, and turn the power supply of the equipment ON again.
502	AD cannot be reading condition.	Confirm the sensor connection status, confirm the power supply of the device, improve the communication environment, close the exposure panel, and turn the power supply of the equipment ON again.
503	Ununsuitable Parameter Value that transferred by factor	Confirm whether there is any difference in the value of the parameter set to AUGE_CCD.ini between the status when it is shipped and the status when it is installed.
504	Failure of CCD Driving Data Setting	Confirm the sensor connection status, confirm the power supply of the device, improve the communication environment, close the exposure panel, and turn the power supply of the equipment ON again.
505	Failure of securing memory in function	The memory of PC is insufficient. Restart PC. If the error cannot be resolved, increase the memory.
506	Access faifure to Communication Control Program Load File that was set by factor	Confirm the file exists in the path of the program file for communication control (default is C:¥NeoPremium¥panorama043.bin) filled in AUGE_CCD.ini.
507	Access failure to Exposure Control Program Load File that was set by factor	Confirm the file exists in the path of the program file for exposure control (default is C:¥NeoPremium¥ce_pano004t.mcs for Panoramic, and C:¥NeoPremium¥ce_cephalo003t.mcs for cephalometric) filled in AUGE_CCD.ini.
508	Access failure to file that was set by factor	Confirm the file exists in the path of the wound correction data file and the calibration data file filled in AUGE_CCD.ini.

509	Communication Control Assembly was not initialized, or exposure control Assy is initialized under condition of failed initialization	Confirm the sensor connection status, confirm the power supply of the device, improve the communication environment, close the exposure panel, and turn the power supply of the equipment ON again.
510	Invalid value is included in Input Film Speed Data	There is a possibility that Film Sending Speed Data is incorrect. Replace with the correct file.
511	Excess of Exposure Range of Input Film Speed Data	There is a possibility that Film Sending Speed Data File is incorrect. Replace with the correct file.

(CCD Error Message)

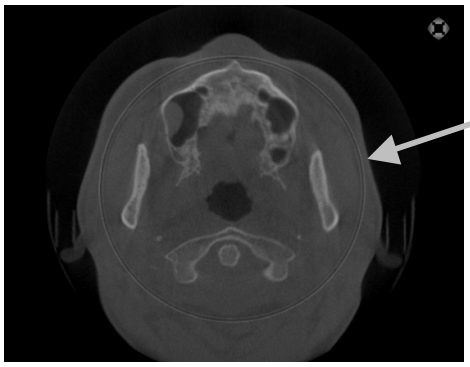
Error Number	Error Message	Corresponding
512	Excess of Total of Exposure Range by Input Film Speed Data and Exposure Range by Time Lag	There is a possibility that “Film Sending Speed Data File” is incorrect. Replace with the correct file.
513	Incorrect Proofreading Data File Size for Correction of Incorrect Sensitivity	There is a possibility that Calibration Data File is broken. Replace with the correct file.
514	Incorrect Data File Size for Damage Correction	There is a possibility that Damage Correction Data File is broken. Replace with the correct file.
518	Data cannot be read from Sensor Unit	1) Check the connection with Sensor. 2) Check the power source for the equipment 3) Check the communication environment 4) Close Operation Panel, and turn the power of the equipment OFF and ON.
519	Communication Control DLL File cannot be read.	Communication Control written in AUGE_CCD.ini: Confirm that there is the file in Pass of DLL File（Default is C:¥NeoPremium¥panLan.dll）.
520	Error of Exposure Control Program Loard Fil	Check the program file for exposure control written in AUGE_CCD.ini and confirm the following situation. 1) Panorama is included in ¥NeoPremium¥ce_pano004t.mcs. 2) Cephalo is included in C:¥NeoPremium¥ce_cephalo003t.mcs.
521	Data Error by communication	Check the communication environment.
522	Invalid image data for making correction data	There is almost no possibility that this error happens. When this errors happen, contact us.
523	No density difference by different value of CCD driving data in image data for completing proofreading data	There is almost no possibility that this error happens. When this error happens, contact us.
524	Communication Control Program Load File Error	There is possibility that Panorama043.bin is broken. Replace with the correct file.

(CCD Error Message)

Error Number	Error Message	Corresponding
551	Initialization error occurred. Communication Error. Communication is not established.	There might be possibility that plural applications for control of sensor are trying to start. Then, finish one of the applications, or re-start up PC.
552	Initialization error occurred. Communication Error. Communication is not established.	Confirm the sensor connection status, confirm the power supply of the device, improve the communication environment, close the exposure panel, and turn the power supply of the equipment ON again.
553	Initialization error occurred. Communication Error. Communication is not established.	Confirm the sensor connection status, confirm the power supply of the device, improve the communication environment, close the exposure panel, and turn the power supply of the equipment ON again.
554	Initialization error occurred. Communication Error. Communication is not established.	Confirm the sensor connection status, confirm the power supply of the device, improve the communication environment, close the exposure panel, and turn the power supply of the equipment ON again.
555	Initialization error occurred. Communication Error. Communication is not established.	Confirm the sensor connection status, confirm the power supply of the device, improve the communication environment, close the exposure panel, and turn the power supply of the equipment ON again. Also, check the setting of the IP Address, too.
560	Initialization error occurred. Communication Error. Communication is not established.	Confirm the sensor connection status, confirm the power supply of the device, improve the communication environment, close the exposure panel, and turn the power supply of the equipment ON again. There is possibility that the sensor is defective.
570	Communication Error. Communication with equipment is not established.	Check the power of the equipment, check the connection of RS232C Cable, check the communication environment, close The exposure panel, and turn the power of the equipment ON again.
593	BMP (8bit) File Writing Error	Restart PC, and turn the power of the equipment ON again.
594	Reading Error of Image Data (12 bit) File	Restart PC, and turn the power of the equipment ON again.
595	Memory Obtaining Error	Restart PC, and turn the power of the equipment ON again.
596	Image Data File Writing Error	Restart PC, and turn the power of the equipment ON again.
597	Parameter Error	Restart PC, and turn the power of the equipment ON again.
598	Memory Obtaining Error	Restart PC, and turn the power of the equipment ON again.
599	Film Sending Speed Data File Reading Error	Check that “FILM FOLDER”, or “Necessary Film Sending Speed Data File in FILM Folder” exist.（AG_**.dat）

The ring-shaped artifact occurs on CT axial image.

This problem might happen suddenly in rare case due to the characteristic of FPD.
Make the treatment in <Note 1>.



Ring artifact
(Black-color artifact occurs sometime.)

<Note 1> The action method when ring artifact occurs on the image

1-1. In case that it is within 6 months after the installation or after maintenance of the equipment:

1-1-1. When the number of defect is 1 pixel or 1 line:
Register the Defect Map according to “FPD Defect Registration Manual (No.D01-0145)”.
Remarks)
If the defect increases, obey the instruction of below <Note 1.2>.

1-1-2. When the number of defects is more than 2 pixels or more than 2 lines:
※ Make the following treatment according to “FPD Calibration Manual (No.D01-0138)” and “FPD Defect Registration Manual (No.D01-0145)”.

1)Energize FPD more than 1 hour.
2)Make “Gain Calibration”.
3)Register “Defect Map.
Remarks)
If the defect increases, make the following treatment in <Note 1-2>.

<Note 1.2> In case that it is more than 6 months after the installation or the after maintenance of the equipment:
Or in case that it is more than 6 months after the installation from the completion of the assembling and the adjustment:

Make the following treatment according to AUGE system adjustment manual (D01-0134).

1).Energize FPD more than 3 hours.
2).Make “Gain Calibration”.
3).Check of the defect.
（Adjust the brightness value of captured image to change the Tube Voltage and Tube Current）

(1) Check the image with brightness value of 400 to 500
（Or check the image taken by lowest Tube Voltage and lowest Tube Current under test mode）.
(2) Check the image with brightness value of 4,000 to 5,000.
(3) Check image with brightness value of around 10,000 (without saturation).
1: When there is any defect in checking of (1) to (3), register the defect.
2: When “Defect” was registered, check the defect by checking of (1) to (3).

3: When any defect occurs at 4th checking after occurrence and the registration of the defect three times, take the below data and repair FPD together with the below data.

- Location of the defect which was registered at this time and location of the defect that occurred.
- Image data for check of the defect on the image that was taken at last time.
  1. Select “Save As” with Drop Down Menu by right-click of the mouse on the image, and save the image as file format “VIVA”.
- Defect Map File (refer below)
- Gain Calibration File (refer below)
- Offset Calibration File (refer below)
  1. Start “VIVA” software
  2. Set the Acquisition mode on left of VIVA software as “2×2 G1 30fps”.
  3. Select “Tools Menu”, “Command Processor”, and “Retriever files”.
  4. “Retrieve Files Dialogue” is displayed.
     Put check mark to “Base Defect File”, “Gain Calibration File”, and “Offset Calibration File”, then, push Browse button to decide the path and the file name.
  5. Set all the modes under these file names as “2x2 G1 30 fps”.
  6. Push “Retrieve” button.
  7. After capturing, click “OK” button.

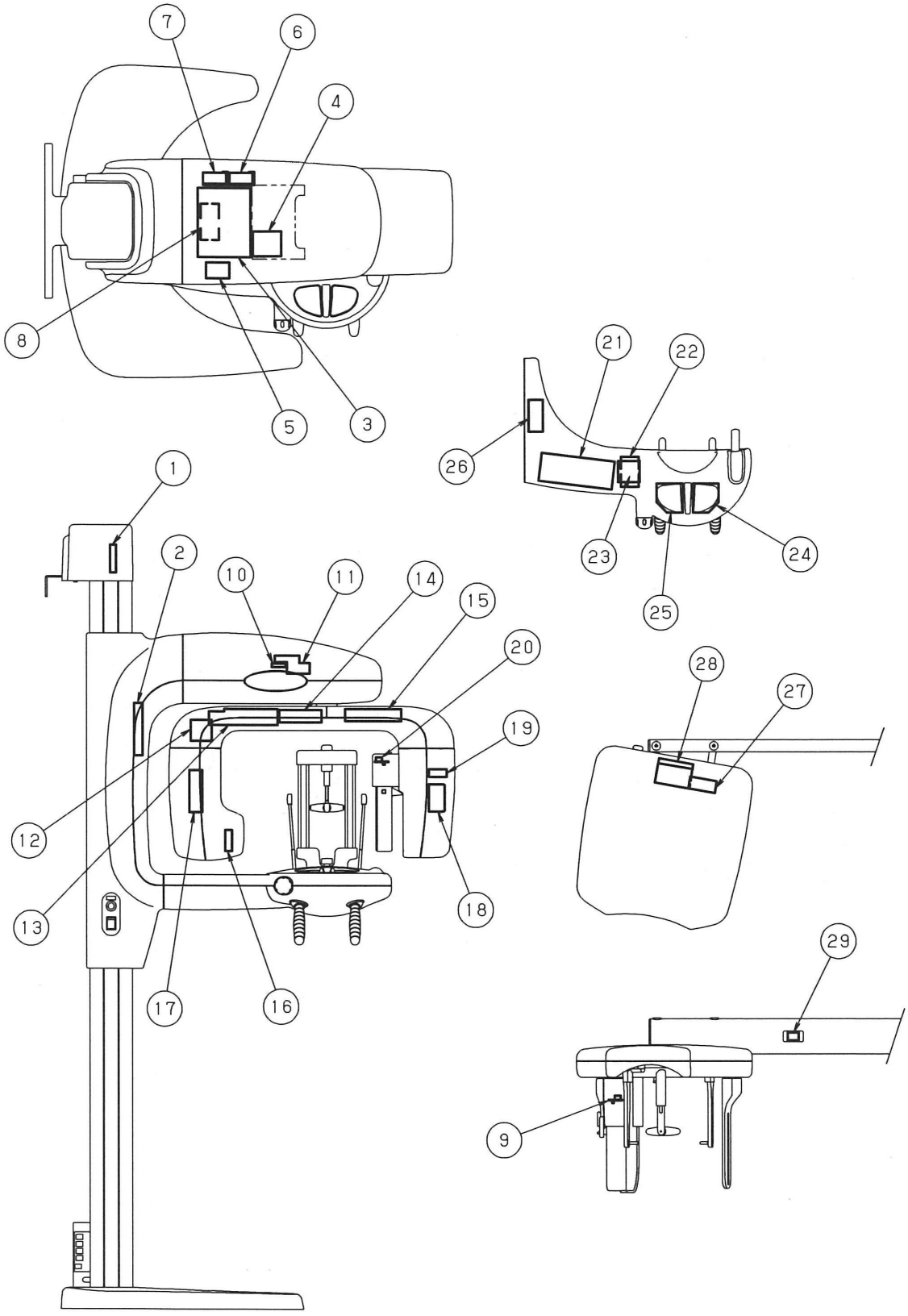
* Dark Image Data (refer below)
  1. Start “VIVA” software.
  2. Set the Acquisition mode on left of VIVA software to “2×2 G1 30fps”.
  3. Select “Acquisition” and “System Settings”.
  4. System Settings dialogue is displayed.
     Remove the check mark from “Offset Corrections”, “Gain Corrections”, And “Pixel Defect Map” on right of the dialogue, and push “Apply” button, and push “OK” button.
  5. Push the green round button on right side of Tool Bar in the screen of VIVA Main Window.
  6. “Allocate Buffers” dialogue is displayed.
     Default value is already set as “10” in “Number of Frame Buffers” in the dialogue. Click “OK” button.
  7. After a few seconds, push red square button on right of Tool Bar in the screen of VIVA Main Window.
  8. Push “Retrieve Image” button on the top of the screen of VIVA Main Window to capture a image.
  9. Select “Save As” from drop down menu by right-click of the mouse on the image and save the image by file format as “VIVA”.
  10. Select “Acquisition Menu” and “System Settings”.
  11. “System Settings” dialogue is displayed.
      Put check mark in “Offset Corrections”, “Gain Corrections”, and “Pixel Defect Map” on right side of the dialogue, push “Apply” button, and push “OK” button. Then, shut down the VIVA software.

Reference 1: If any defect will occur on the next line or on the pixel after the registration of the Defect, there is possibility that the hardware might be defect.
Reference 2: If any defect will occur intensively in the range of ASIC unit (Strip of paper of vertical direction in every 64 pixel), there is possibility that the hardware might be defect.

06. Configuration for Printed Circuit Board

1. Overall Drawing

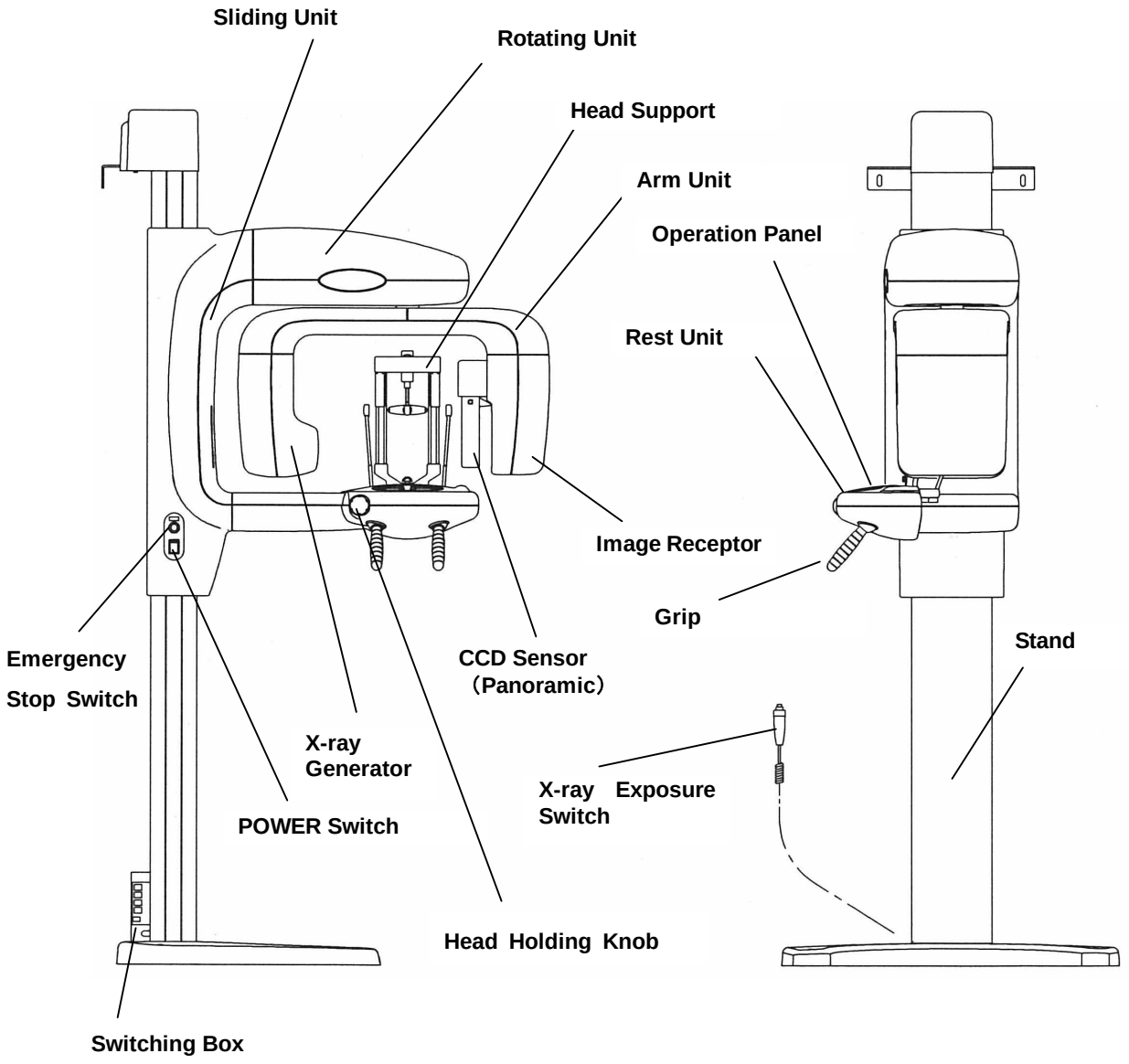
Printed Circuit Boards are located as shown in the below drawing.



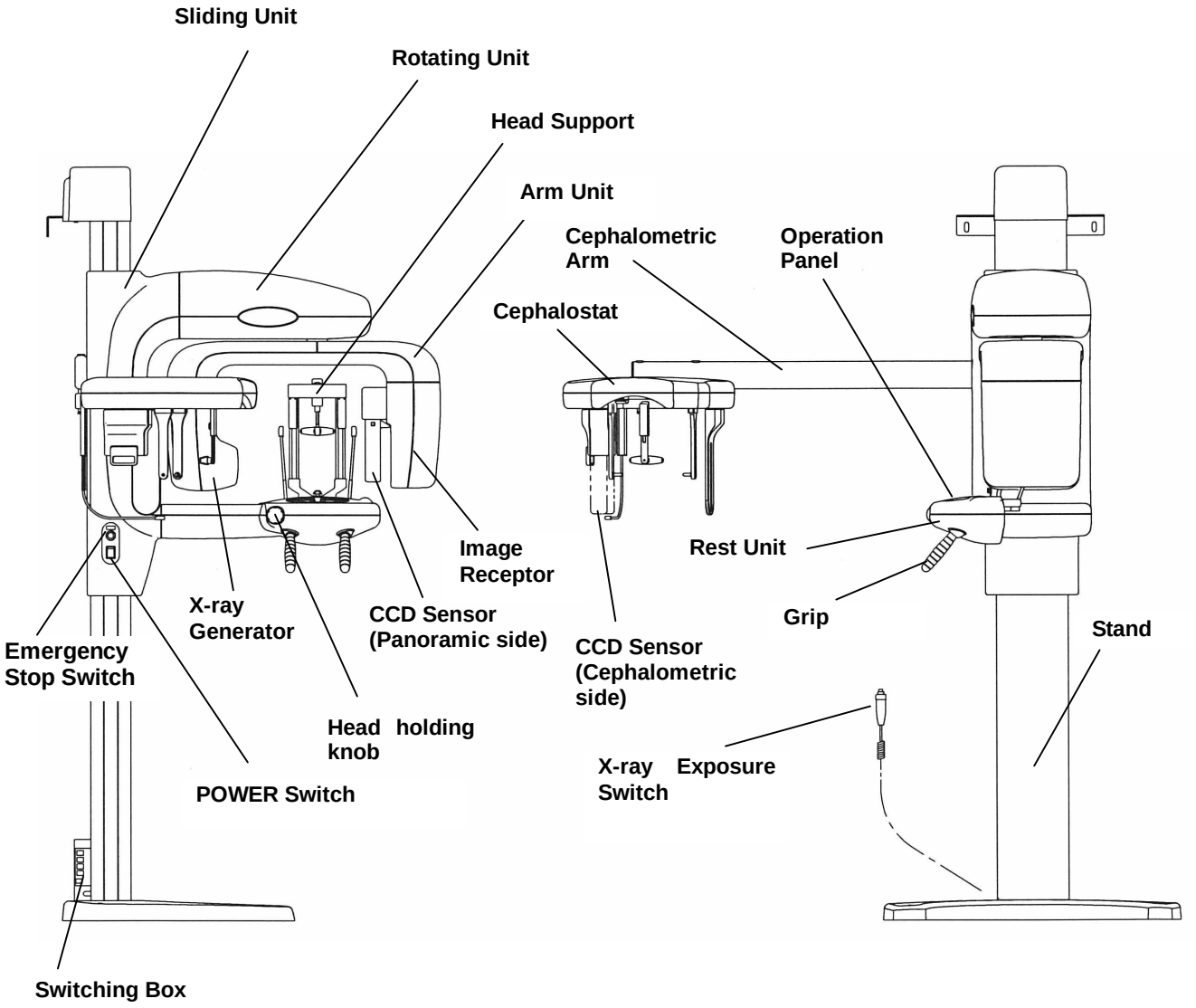
No	Name of Printed Circuit Board
1	DC Motor Board
2	CNYU Board
3	MOTOR CPU Board
4	POWER Board
5	Rotation Motor Driver
6	Y Axis Motor Driver
7	X Axis Motor Driver
8	Switching Power Supply
9	CNP board
10	CNC Board
11	CNB Board
12	Head Sliding Motor Driver
13	High Frequency Inverter Board
14	PFC AC Filter Board
15	CONTROL Board
16	Collimator Motor Board
17	High tension generator board
18	Power supply for FPD
19	DC-DC CONVERTER board
20	CNP board
21	Switching power supply
22	Beam motor board
23	DC POWER 1 board
24	PANEL-R board
25	PANEL-L board
26	CNK I board
27	CNM board
28	Cephalometric motor board
29	CM SW board

07. Parts List

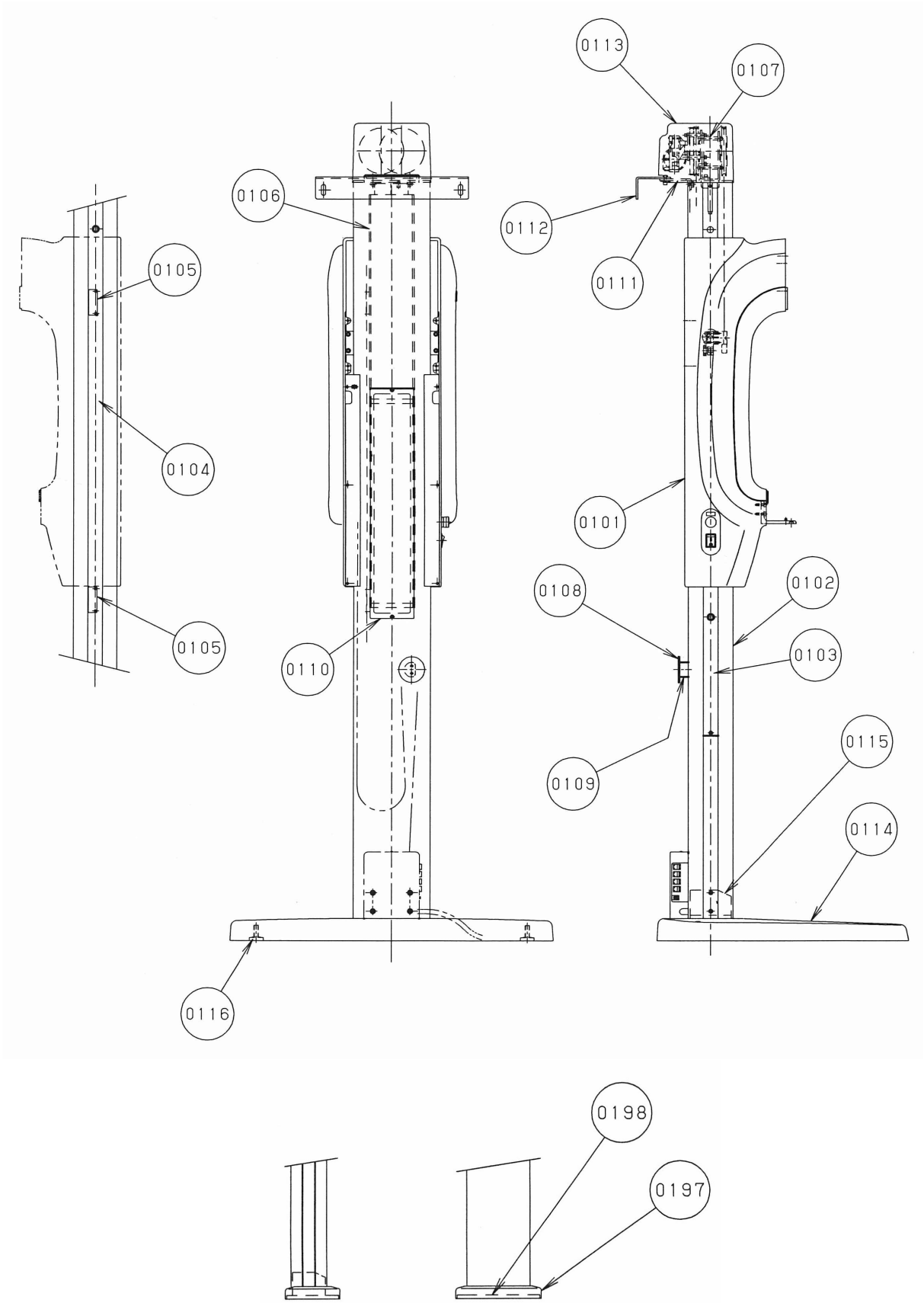
Bel-Cat / Bel-Cat PA



* Bel-Cat does not include CCD sensor.


Sliding Unit
Rotating Unit
Head Support
Arm Unit
Cephalometric Arm
Operation Panel
Cephalostat
Image Receptor
Rest Unit
X-ray Generator
CCD Sensor (Panoramic side)
Grip
Stand
Emergency Stop Switch
CCD Sensor (Cephalometric side)
Head holding knob
X-ray Exposure Switch
POWER Switch
Switching Box

1. Sliding Unit ASSY

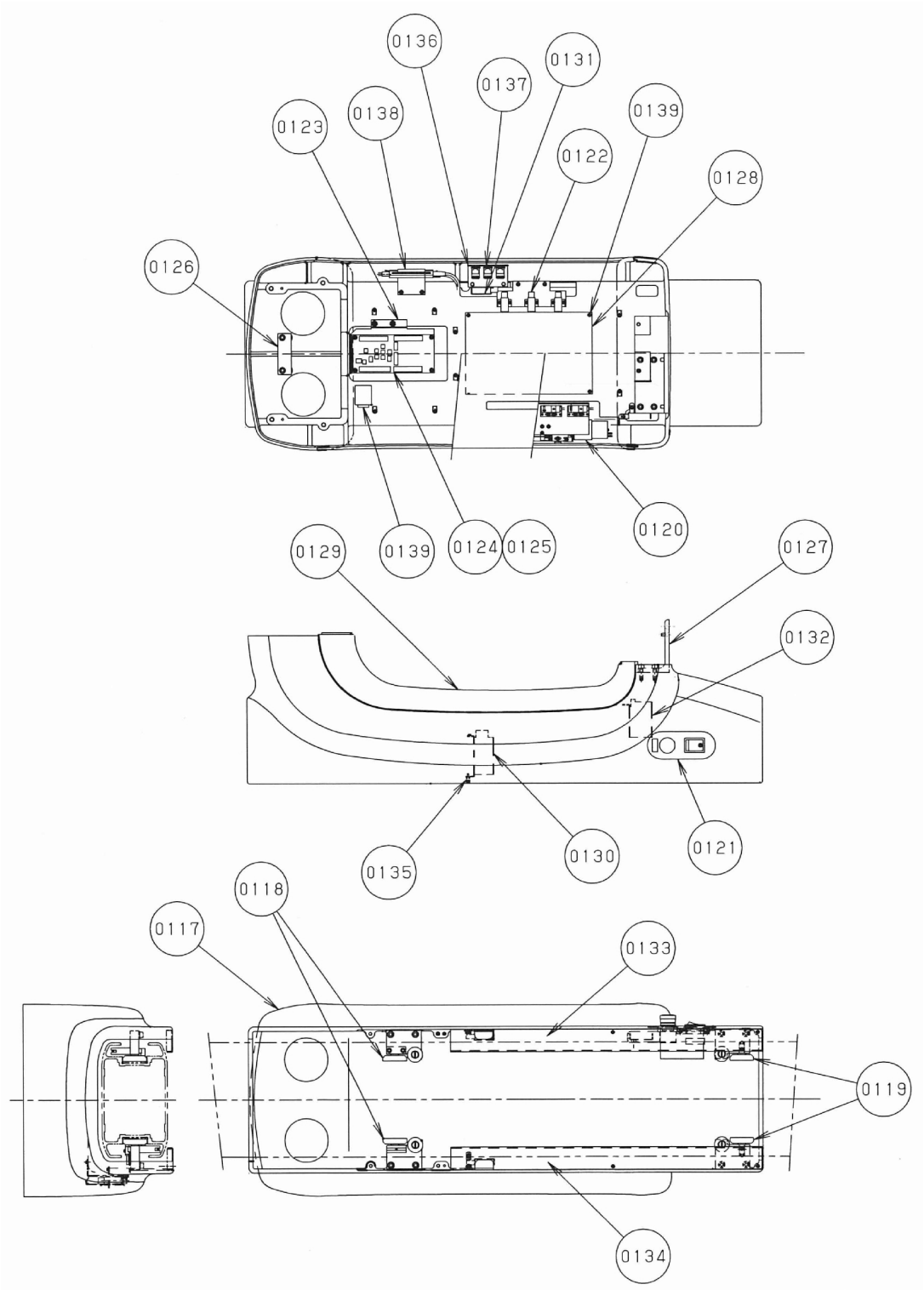


Sliding Unit ASSY

No.	Drawing Number	Drawing Name	Qty.	Note
0101	108-01257	Sliding Unit ASSY	1	
0102	308-04040-01	Stand Pipe	1	
0103	408-11647-03	Rail	1	
0104	408-11647-04	Rail	1	
0105	408-10304	Shading Plate	2	
0106	308-04008-01	Counter Weight ASSY	1	
0107	308-03988	Driving Pulley ASSY	1	
0108	408-11648	Cable Guide	1	
0109	408-11649	Frange	1	
0110	408-11650	Stand Cover	1	
0111	308-04010	Pulley Cover	1	
0112	308-04011-01	Wall Mounting Bracket	1	
0113	208-02174	Top Cover	1	
0114	108-01265	Base C	1	
0115	308-02548	Joint Block	1	
0116	937-30005	Foot TTM-00159	4	

0197	208-01776-03	Stand Lower Cover	1	
0198	408-09633	Flange	1	

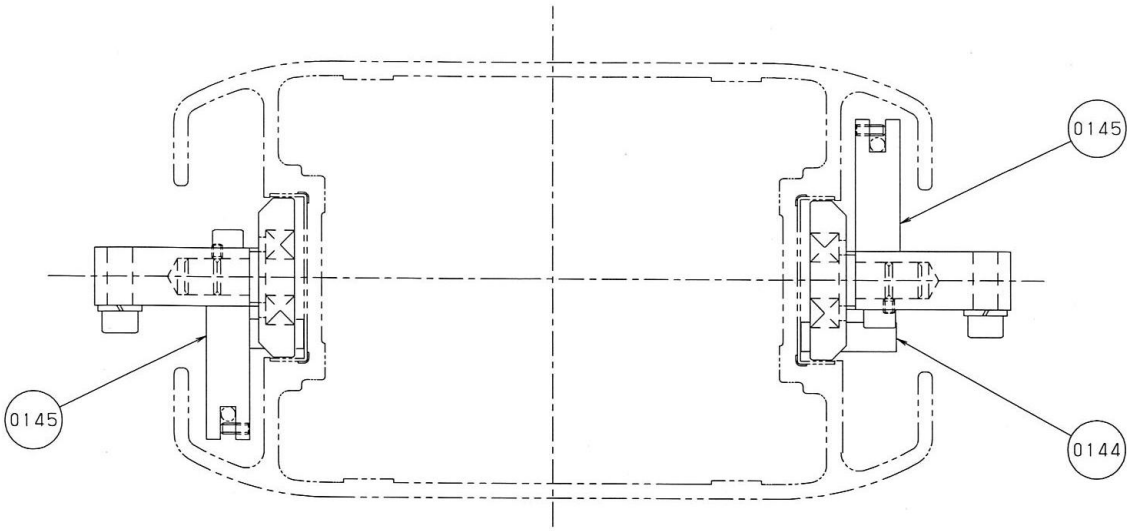
1.1. (0101) Sliding Unit ASSY



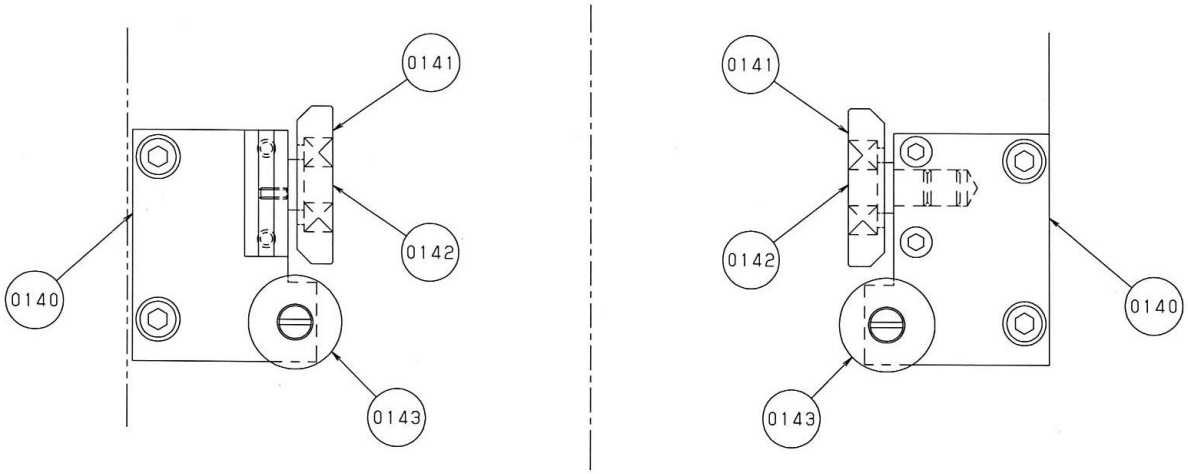
（０１０１）Sliding Unit ASSY

No.	Drawing Number	Drawing Name	Qty.	Note
0117	108-01258	Sliding Unit ASSY	1	
0118	308-04006	Upper Roller ASSY	1	
0119	308-04007	Lower Roller ASSY	1	
0120	308-04005	Frankfort Plane Beam ASSY	1	
0121	408-11572	Switch ASSY	1	
0122	408-11558	Up & Down Movement for Sensor ASSY	1	
0123	308-04029	Fixing Plate for Relay Board	1	
0124	408-11382	CNYU BOARD ASSY	1	
0125	408-11615	Insurance Sheet（CNYU)	1	
0126	408-11640	Hook Bar	1	
0127	308-04030	L Metal Fitting for Chinrest ASSY	1	
0128	408-11571	Cable Pressor	1	
0129	108-01259	Sliding Unit Cover	1	With Filter A
0130	408-11607	Cable Guide (1)	1	
0131	408-11608	Cable Guide (2)	1	
0132	408-11609	Cable Guide (3)	1	
0133	308-04031-01	Back Cover	1	
0134	308-04031-02	Back Cover	1	
0135	937-38021-07	Spacer BSF-310	1	
0136	408-11577	LAN Adaptor Fixing Plate	1	
0137	988-50047	Relay Adaptor STP NWSI-C5E-SH	3	
0138	408-11578	Switching Hab ASSY	1	
0139	975-00028-01	Law Frequency Filter T-72SN13-026K	1	

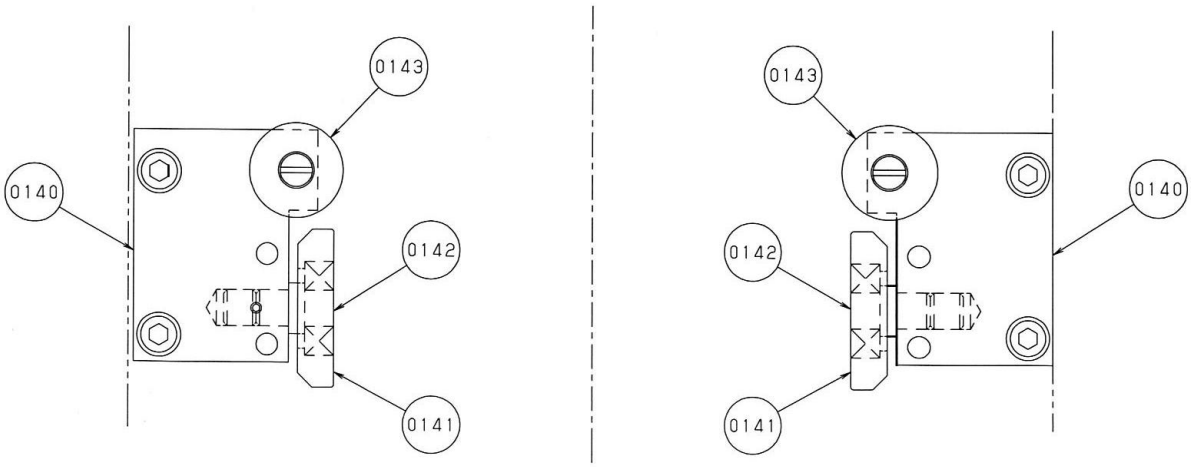
1. 2. (0118) Upper Roller ASSY



Back side



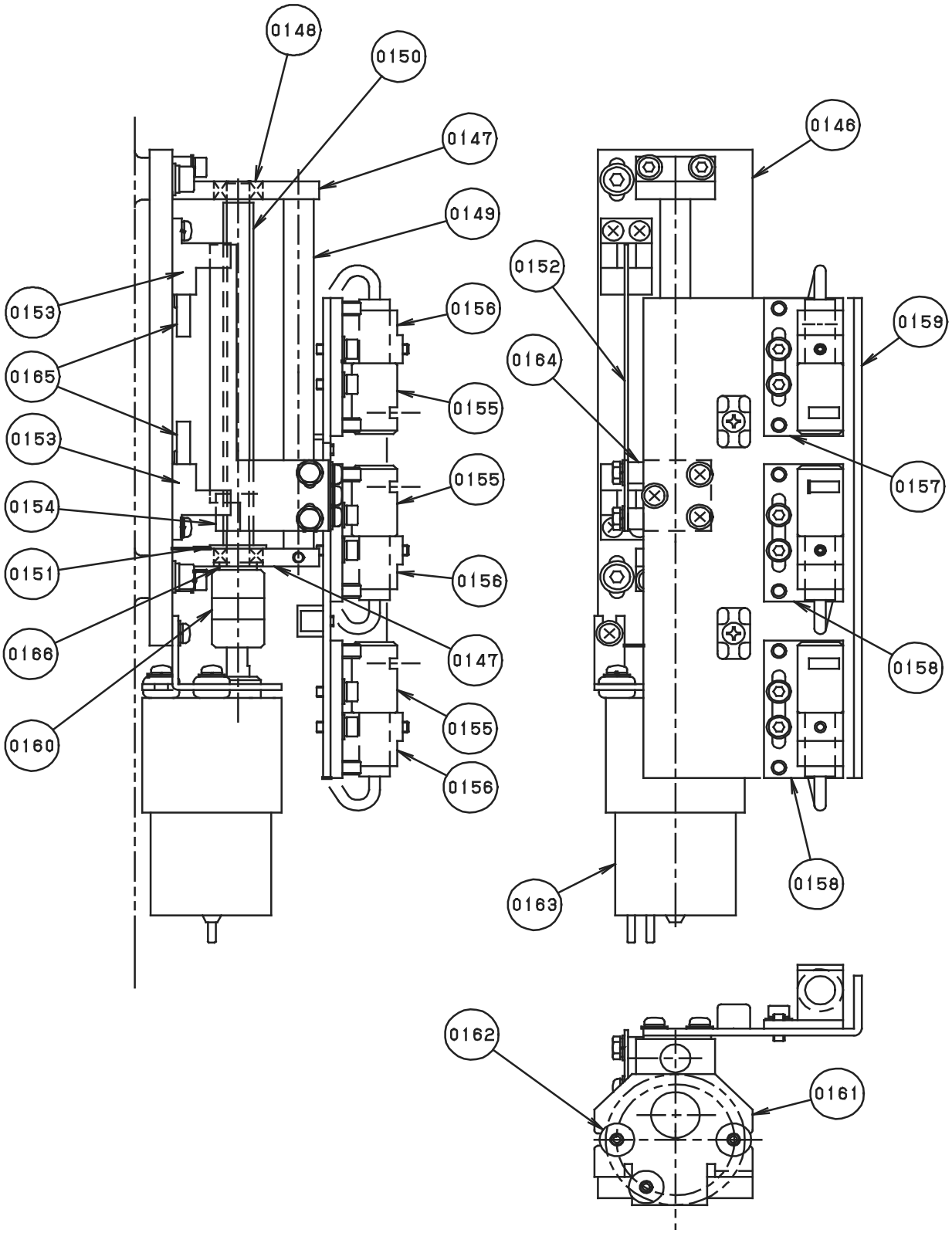
(0119) Lower Roller ASSY



(0118) **Upper Roller ASSY**
(0119) **Lower Roller ASSY**

No.	Drawing Number	Drawing Name	Qty.	Note
0140	408-11575	Roller Bracket	4	
0141	408-05662	Roller	4	
0142	408-05326	Roller Axis	4	
0143	030-03000-00	Bearing 6000ZZ	4	
0144	408-05331	Axis	4	
0145	408-05332-03	Wire Stopper (A) (B)	2	

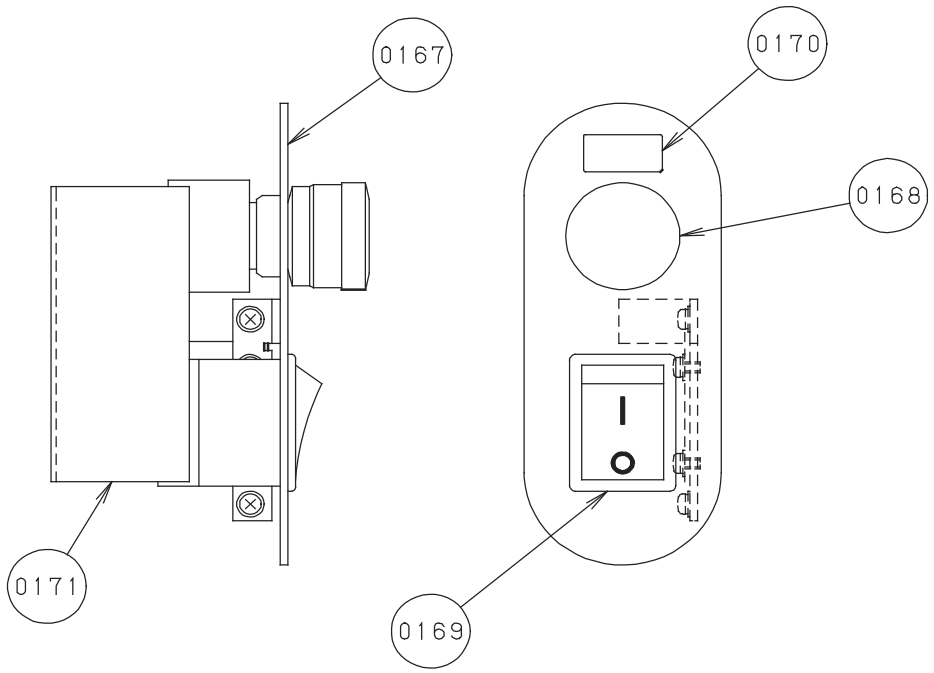
1. 3. (0120) Frankfort Plane Beam ASSY



(0120) Frankfort Plane Beam ASSY

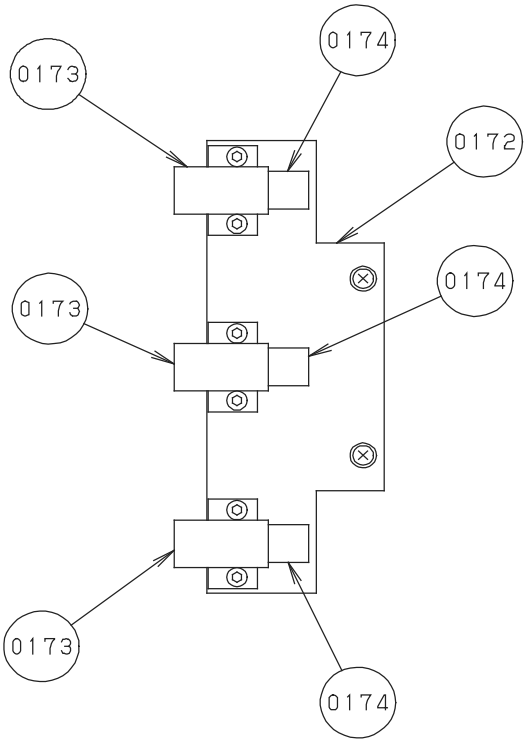
No.	Drawing Number	Drawing Name	Qty.	Note
0146	408-11560	Fixing Table	1	
0147	408-11561	Bearing (1)	2	
0148	930-00021-03	Bearing 686ZZ	1	
0149	408-11562	Shaft	1	
0150	408-11563	Screw Bar	1	
0151	930-00011-63	Bearing F686ZZ	1	
0152	408-11564	Sensor Fin	1	
0153	978-60004-13	Photo-micro Sensor EE-SX674	2	
0154	408-11565	Slider	1	
0155	962-05006	Laser Marking Projector LDV167LS	3	
0156	408-11568	Holder	3	
0157	408-11567-01	Base	1	
0158	408-11567-02	Base	2	
0159	408-11569	Beam Fixing Plate	1	
0160	932-41025-02	Coupling ALS-014-Y-6-6	1	
0161	408-11570	Motor Fixing Plate	1	
0162	934-30005-01	ISODUMP Gromet G-410-1	3	
0163	977-60001-07	DC Geared Motor TG-38E-LG66	1	
0164	937-38008-40	Brass Space CB-304	1	
0165	078-60099	Connector EE-1001	2	
0166	937-38041-01	Steel Spacer CF-602E	1	

1. 4. (0121) Switch ASSY



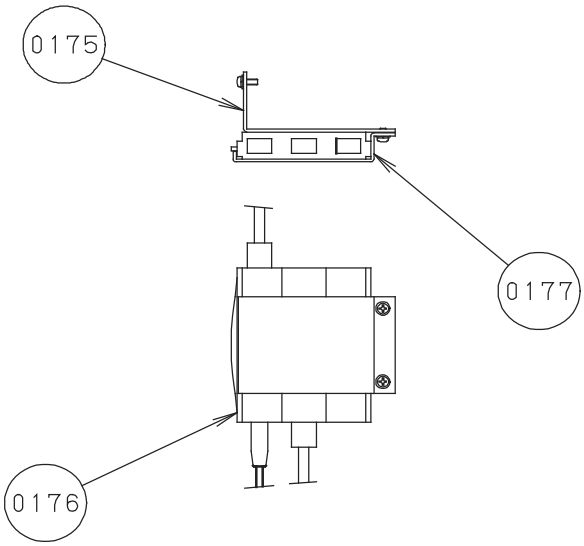
No.	Drawing Number	Drawing Name	Qty.	Note
0167	408-11573	Plate	1	
0168	964-50061	Emergency Stop Button Switch XA1E-BV311R	1	
0169	964-28001-02	Switch A8G-107-1G-24	1	
0170	614-01445	Stop Seal	1	
0171	408-11574	Cable Guide	1	

1. 5. (0122) Up / Down Movement Sensor ASSY



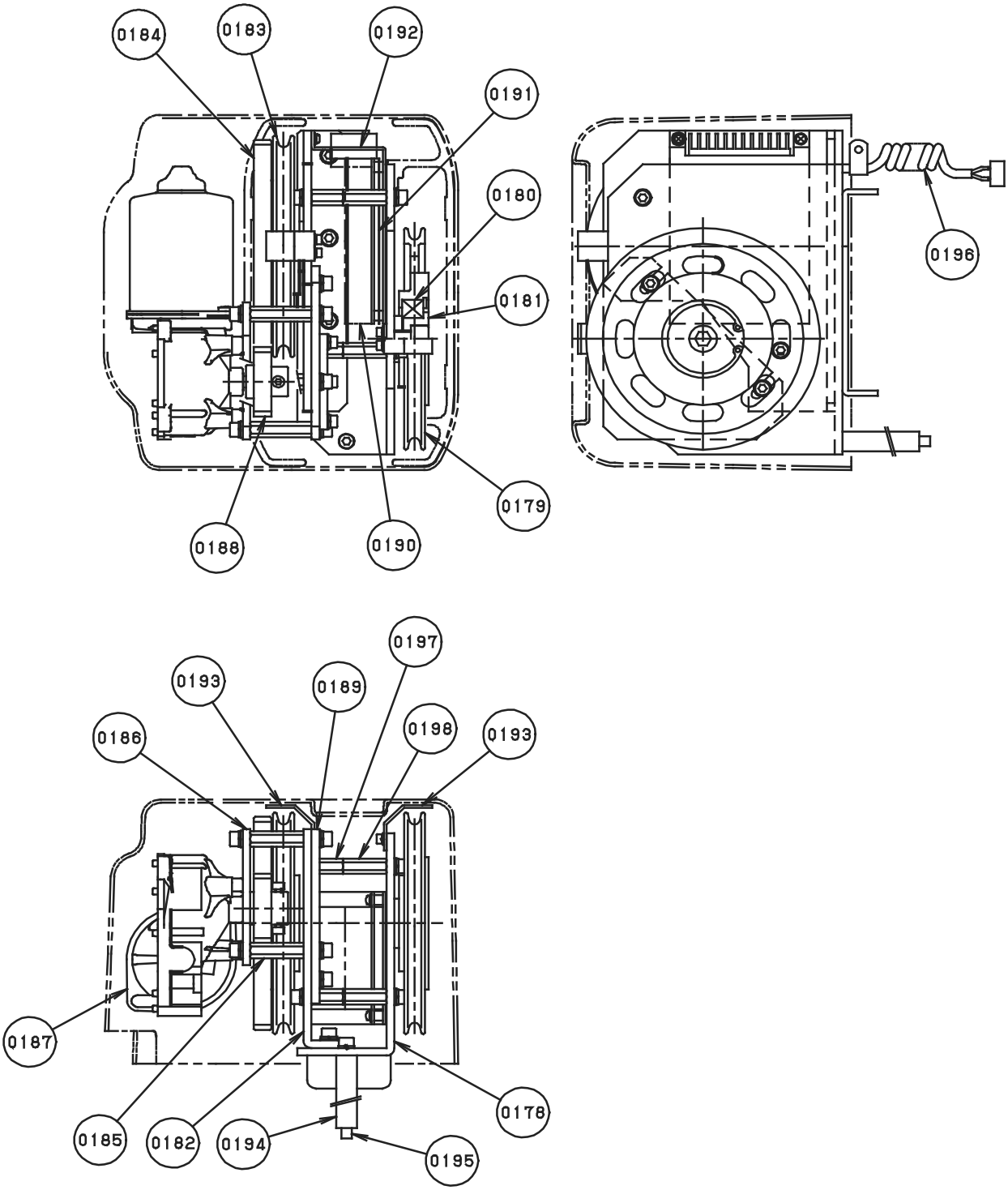
No.	Drawing Number	Drawing Name	Qty.	Note
0172	408-11559	Sensor Fixing Metal Plate	1	
0173	978-60007-02	Photo-micro Sensor EE-YS672	3	
0174	078-60099	Connector EE-1001	3	

1. 6. (0138) Switching HUB ASSY



No.	Drawing Number	Drawing Name	Qty.	Note
0175	408-11579	Base Metal Plate	1	
0176	408-10578	HUB ASSY	1	
0177	408-11580	Presser Metal Plate	1	

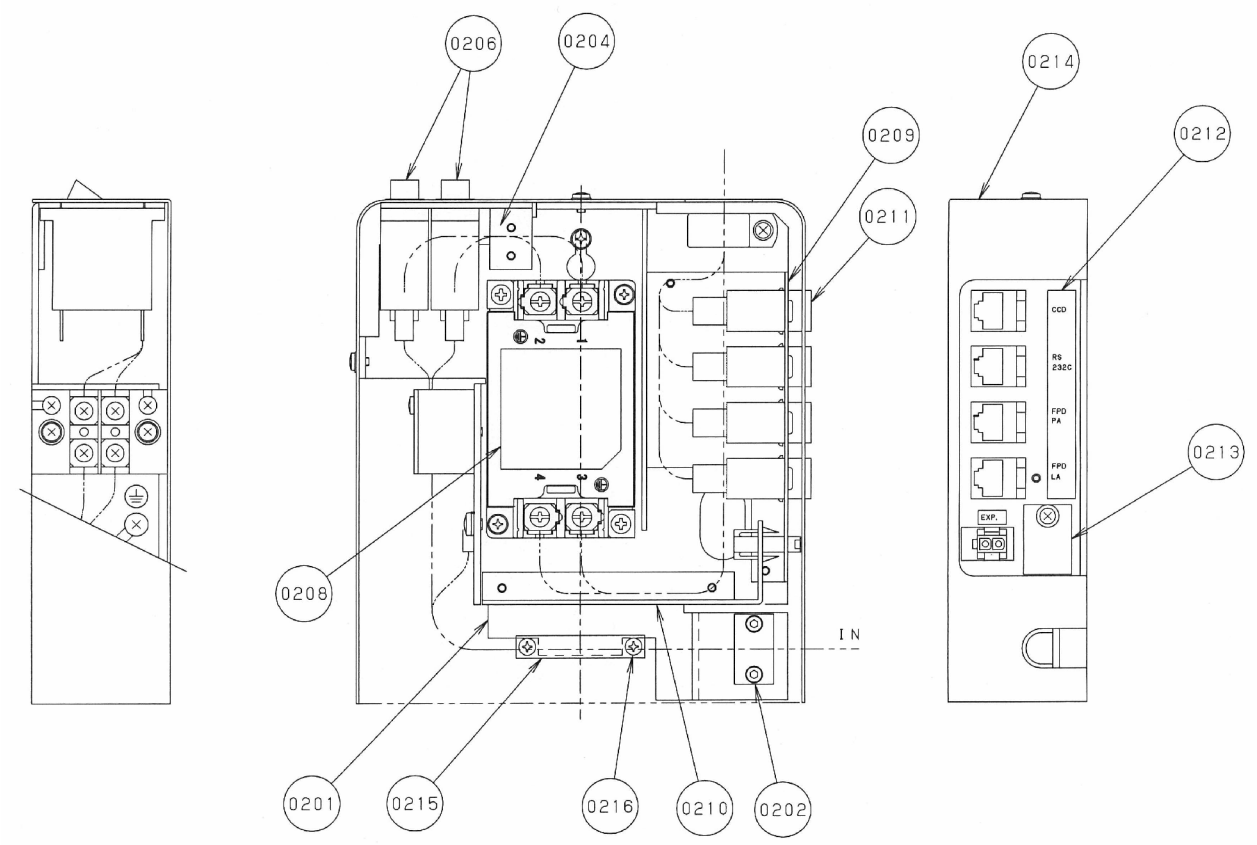
1. 7. (0107) Driving Pulley ASSY



(0107) Driving Pulley ASSY

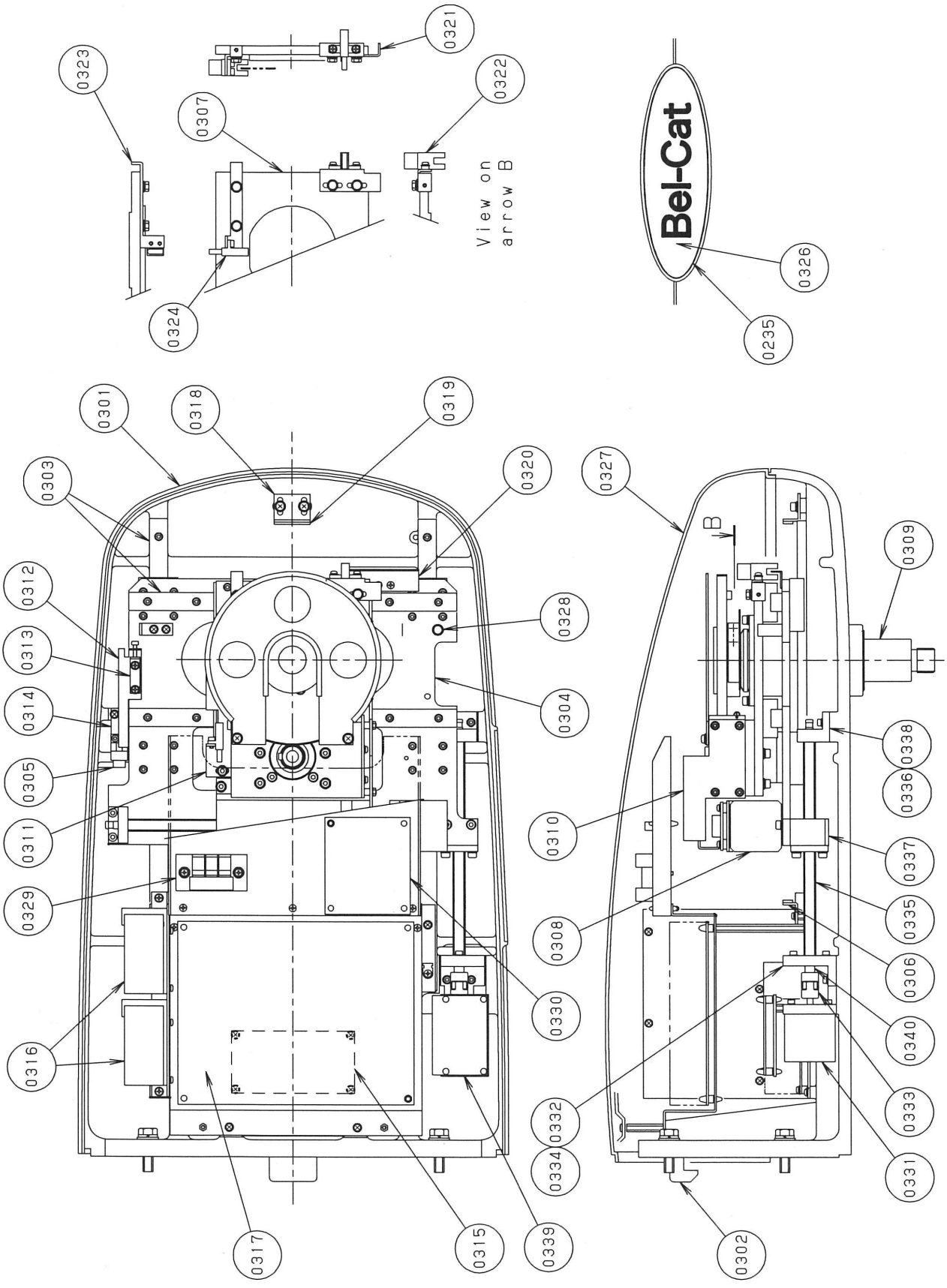
No.	Drawing Number	Drawing Name	Qty.	Note
0178	308-04000	Frame (1)	1	
0179	408-04717-00	Pulley	1	
0180	030-03005-00	Bearing 6005ZZ	2	
0181	408-04718	Axis	2	
0182	308-04001	Frame (2)	1	
0183	408-04717-03	Pulley	1	
0184	308-04002	Gear (Large)	1	
0185	937-38038-09	Steel Spacer ASF-535	3	
0186	408-11553	Motor Bracket	1	
0187	977-79039	DC MOTOR Geard Type DCK31 404.864	1	
0188	408-11554	Gear (Small)	1	
0189	408-11555	Adjuster	1	
0190	408-11408	DC MOTOR BOARD ASSY	1	
0191	408-11548	Insurance Sheet	1	
0192	308-04003	Fixing Metal Plate for P.C. Board (Pulley)	1	
0193	408-11557	Wire Guard	2	
0194	408-05741-04	Rubber Indicator Axis	1	
0195	408-06714	Stopper	1	
0196	915-30031	Curl Cord	1	

2. Switching Box ASSY



No.	Drawing Number	Drawing Name	Qty.	Note
0201	308-04014	Fixing Metal Plate for parts	1	
0202	408-10817-00	Cable clamp	1	
0203	-	—	—	
0204	408-11583	Fixing Plate for Fuse	1	
0205	-	—	—	
0206	965-85020	Circuit Protector IN-1-A8E-19-1B	2	
0207	-	—	—	
0208	975-00032-01	Noise Filter NAH-20-000	1	
0209	408-11588	Fixing Metal Plate for LAN Adaptor	1	
0210	408-11586	Shield Plate	1	
0211	988-50047	Relay Adaptor for STP NWSI-C5E-SH	1	
0212	408-11589	Name Plate for Board	1	
0213	408-11590	Cover	1	
0214	308-04016-01	Cover	1	
0215	408-11585	Hook Plate	1	
0216	937-38040-04	Steel Spacer CF-302.5E	2	

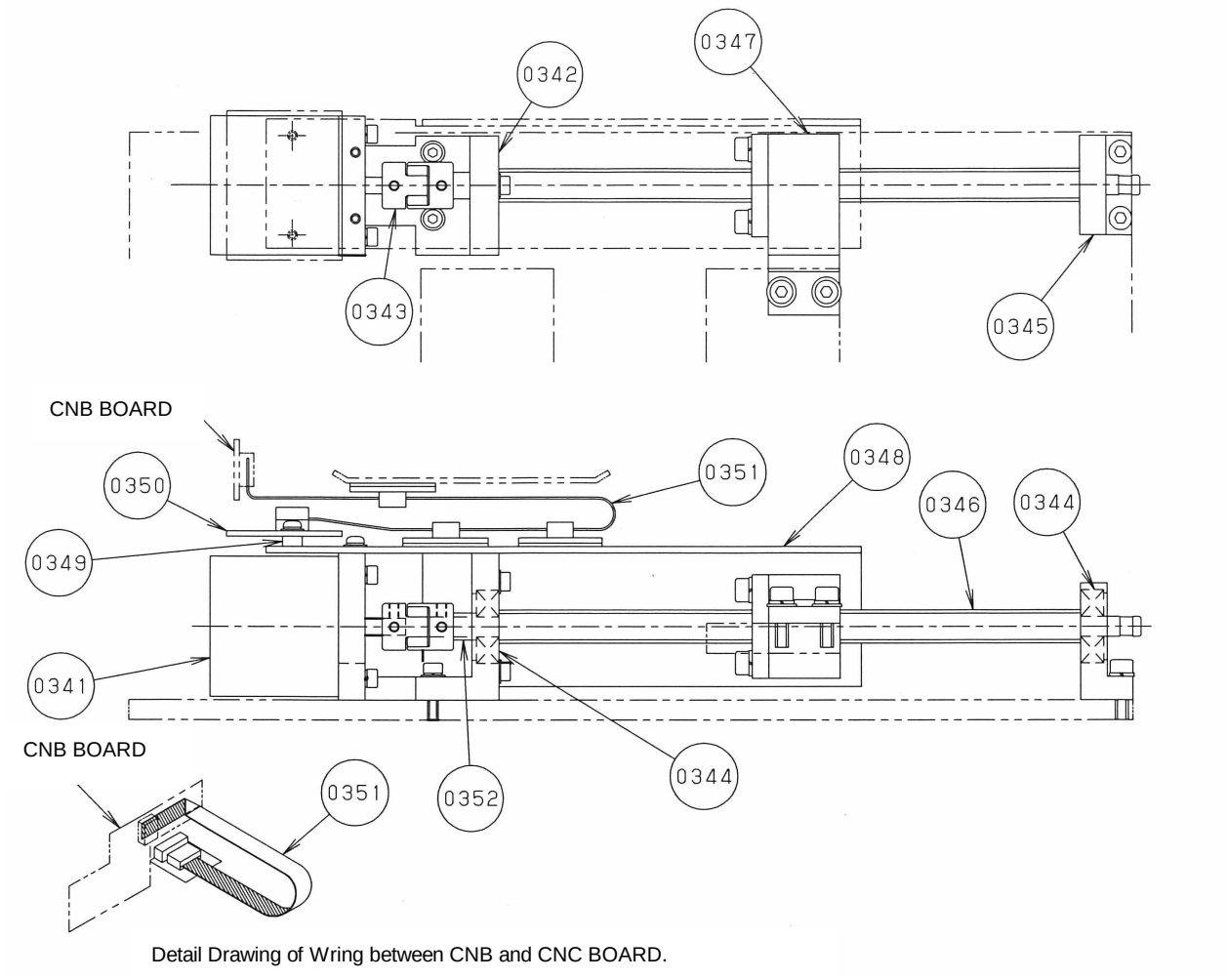
3. Rotating Unit ASSY



Rotating Unit ASSY

No.	Drawing Number	Drawing Name	Qty.	Note
0301	108-01260	Main Body of Rotating Unit ASSY	1	
0302	408-04713	Hook	1	
0303	931-70029-01	LM Guide 2RSR15VMuu+270LM	2	
0304	408-11605	Y Axis Table	1	
0305	978-60004-13	Photo-micro Sensor EE-SX674	1	
0306	408-11244	Stopper	1	
0307	408-10225	X axisX Table	1	
0308	308-04023	X Axis Motor ASSY	1	
0309	308-04018	ARM Driving ASSY	1	
0310	208-02171	R Axis Motor ASSY	1	
0311	408-11246	Rotation Sensor (B) ASSY	1	
0312	408-11612	Sensor Fin (1)	1	
0313	408-07569	Presser Plate (L2)	1	
0314	408-11613	Fixing Plate for Y Axis Sensor	1	
0315	974-80068-01	Switching Power Supply ECM60	1	
0316	-	Motor Driver CRD5107P	2	Supplied with No.0341,0331
0317	408-11380	MOTOR CPU BOARD ASSY	1	
0318	408-11610	Metal Stopper for X Axis (2)	1	
0319	408-11611	Rubber Stopper (2)	1	
0320	408-11617	Sensor Fin (D)	1	
0321	408-07101	Sensor Bracket (C)	1	
0322	978-60004-07	Photo-micro Sensor EE-SX672	1	
0323	408-07109-01	Sensor Bracket	1	
0324	978-60004-10	Photo-micro Sensor EE-SX671	1	
0325	408-11614	Description Plate	1	
0326	408-11917	Description Name Plate	1	
0327	108-01261	Rotation ASSY Cover	1	
0328	937-38035-29	Spacer CF-420E	1	
0329	931-00045-02	Terminal Table (ML-20) ML-20-3P	1	
0330	408-11381	POWER BOARD ASSY	1	
0331	977-79029-03	5 phase stepping Motor CFK544AP2	1	
0332	308-02561	Motor Bracket	1	
0333	932-41025-01	Coupling ALS-014-Y-5-6	1	
0334	930-00021-07	Miniature Ball Bearing 636ZZ	1	
0335	931-50022-00	Ball Screw	1	
0336	930-00021-05	Miniature Ball Bearing 606ZZ	1	
0337	408-11905	Block (C)	1	
0338	408-11596	Bearing (C)	1	
0339	-	Motor Driver CRD5107P	1	A pair with No.0366
0340	937-38034-06	Duracon Spacer C-607	1	

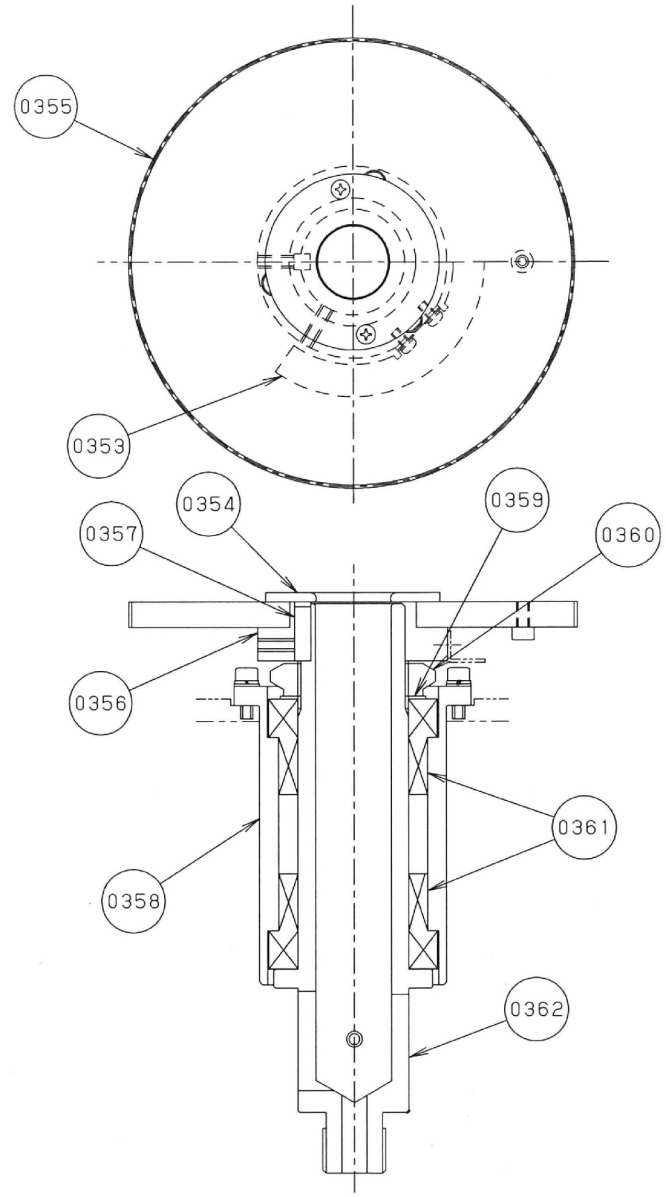
3. 1. (0308) X axis Motor ASSY



Detail Drawing of Wring between CNB and CNC BOARD.

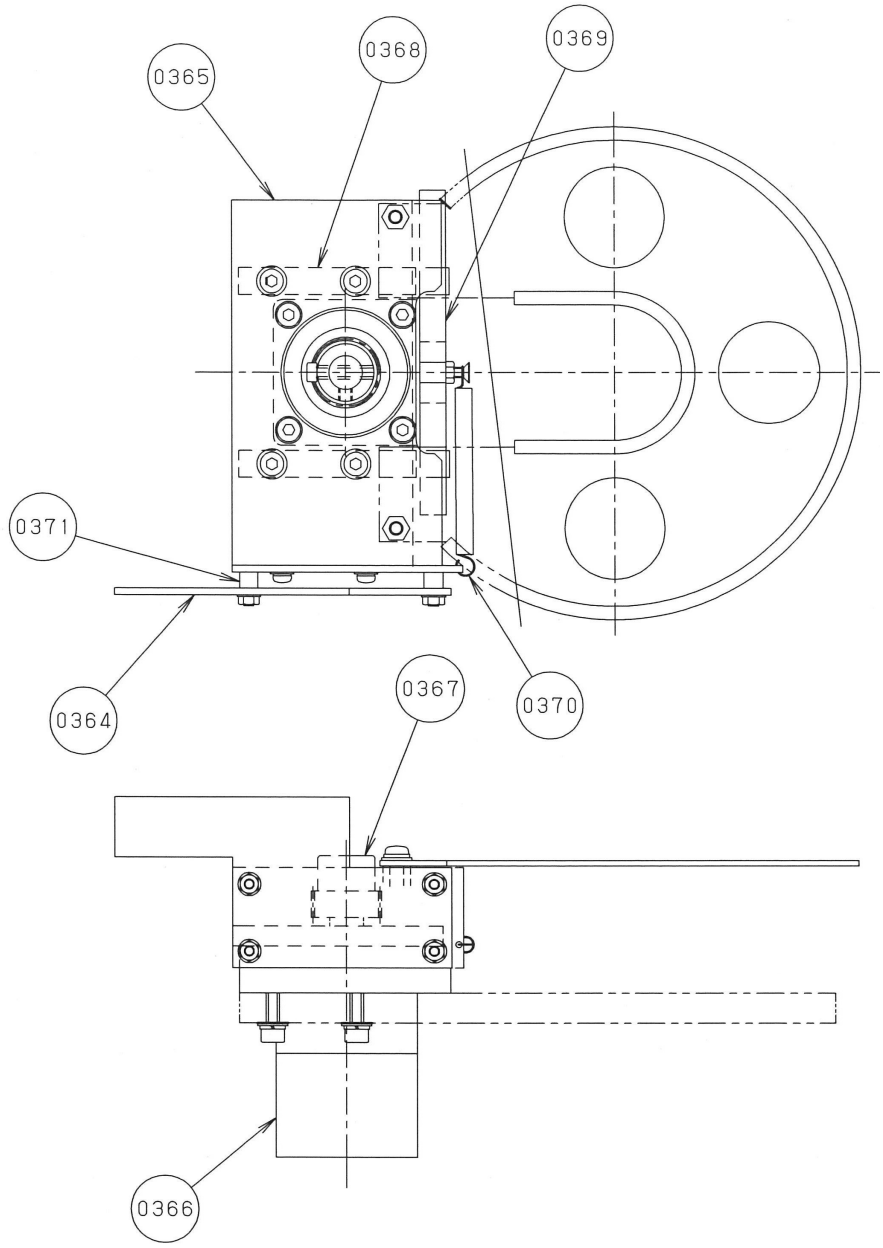
No.	Drawing Number	Drawing Name	Qty.	Note
0341	977-79029-03	5 phase stepping Motor CFK544AP2	1	
0342	308-03303	Motor Bracket (B)	1	
0343	932-41025-01	Coupling ALS-014-Y-5-6	1	
0344	930-00021-07	Miniature Ball Bearing 636ZZ	2	
0345	408-07102	Bearing (B)	1	
0346	931-50022-00	Ball Screw	1	
0347	408-11903-00	Block (A)	2	
0348	408-09261	Cable guide	1	
0349	937-38019-03	Duracon Spacer C-407	2	
0350	408-07263	CNC Board ASSY	1	
0351	408-09414	Cable ASSY	1	
0352	937-38034-06	Duracon Spacer C-607	1	

3. 2. (0309) Arm Driving Axis ASSY



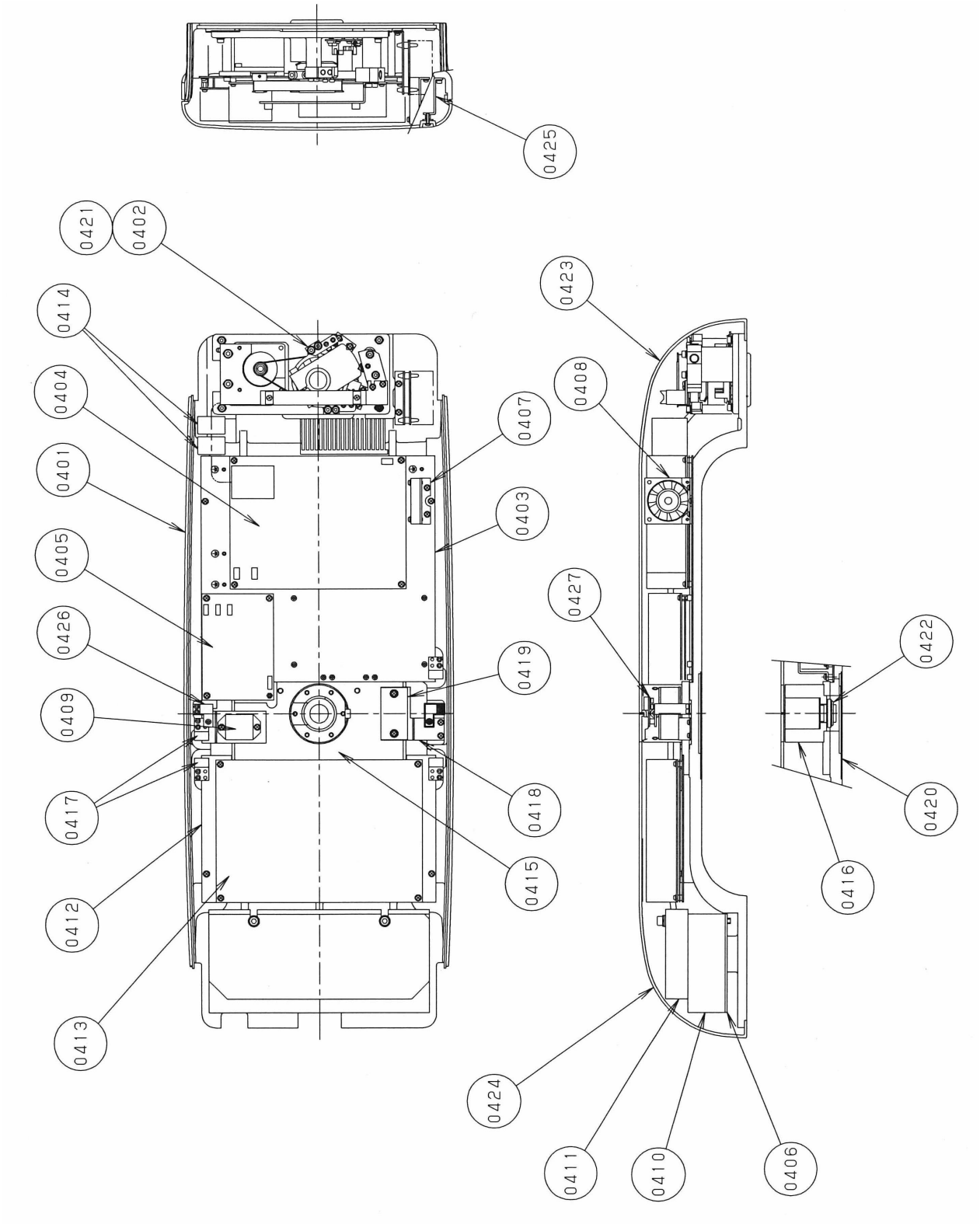
No.	Drawing Number	Drawing Name	Qty.	Note
0353	408-11592	Shield Plate (E)	1	
0354	408-09259	Cable Guide	1	
0355	308-02560	Gear (Large)	1	
0356	308-03302	Boss (B)	1	
0357	408-04746	Key	1	
0358	308-03553	Boss (C)	1	
0359	408-07099	Bearing Presser (A)	1	
0360	923-92004-08	Fine U Nut FU07SC	1	
0361	931-20001-08	Bearing for Combine speculate Roller NKX35Z	2	
0362	308-04019	ARM Suspension Axis (B)	1	

3. 3. (0310) R axis Motor ASSY



No.	Drawing Number	Drawing Name	Qty.	Note
0364	408-06554	CNB Board ASSY	1	
0365	408-11239	Motor Base (1)	1	
0366	977-79037-05	Harmonics Geared Motor CRK543AP-H50	1	
0367	408-11326	Gear (Small)	1	
0368	408-11242	Spacer and Guide	2	
0369	408-11243	Slide Stopper	1	
0370	934-00004-12	Coil Spring	1	
0371	037-38707	Support	4	

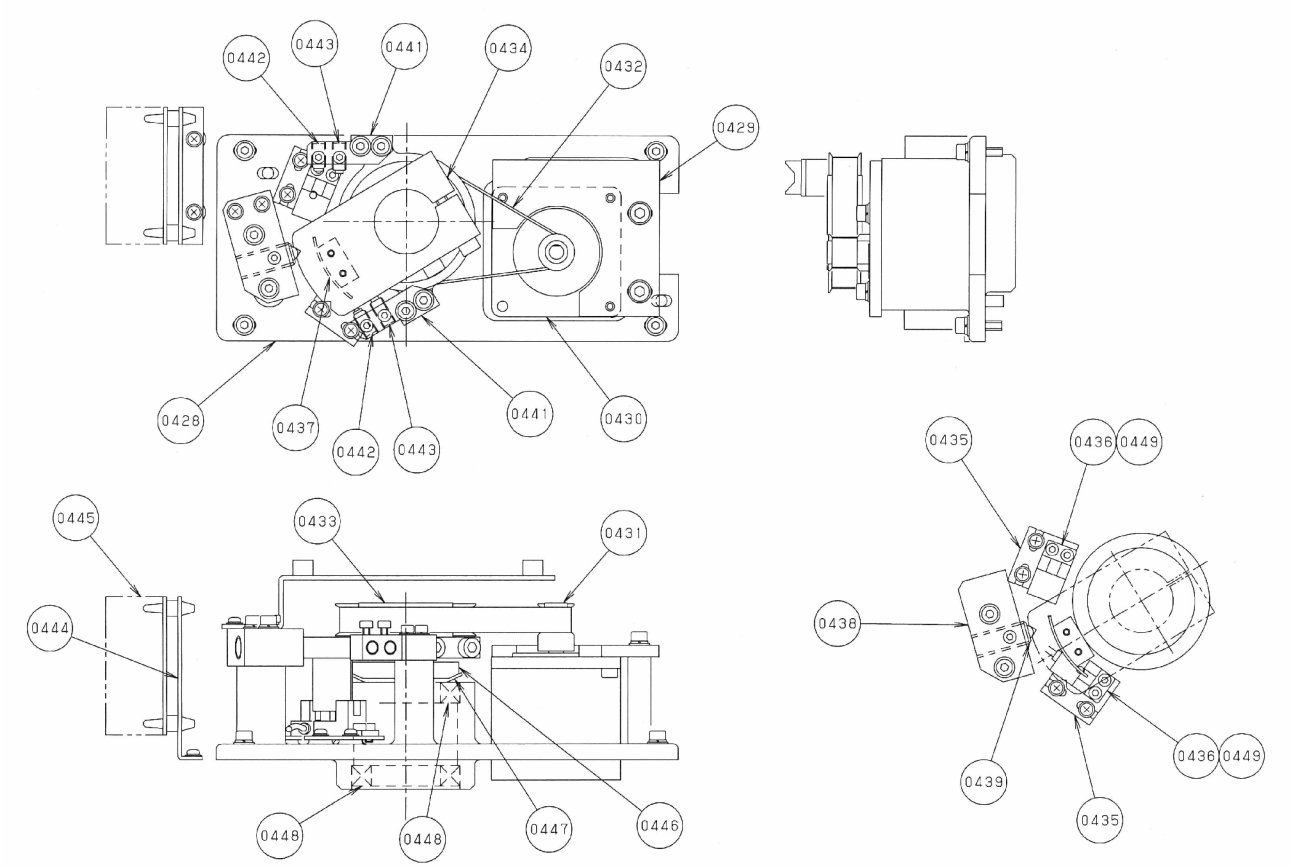
4. Arm Unit ASSY



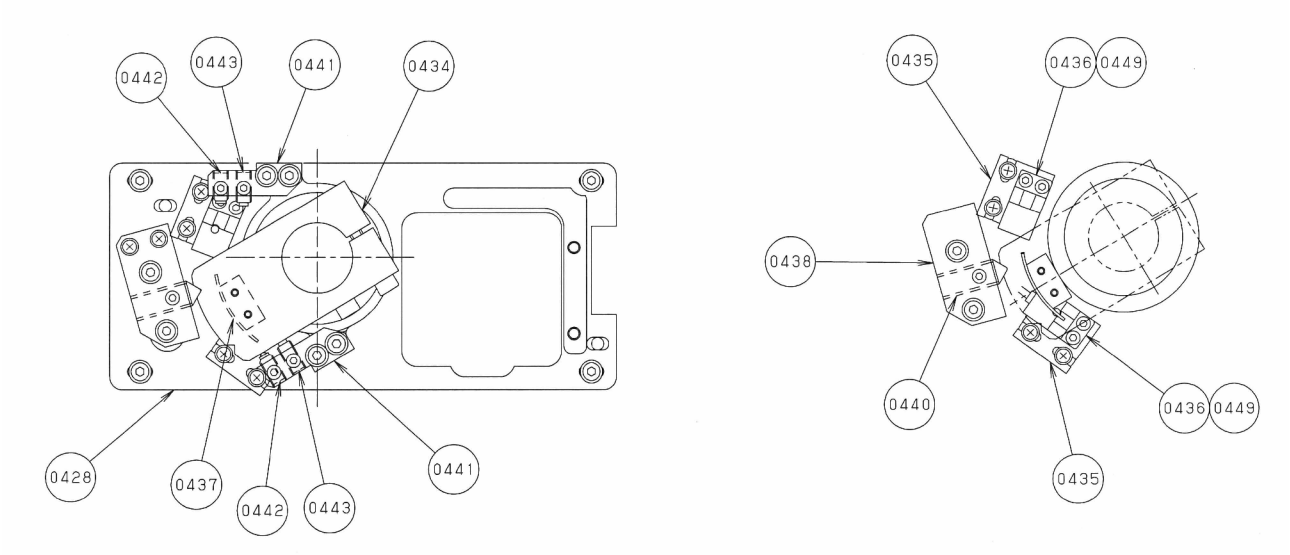
Arm Unit ASSY

No.	Drawing Number	Drawing Name	Qty.	Note
0401	108-01250	ARM Body	1	
0402	308-03973-01	Head Swing ASSY	1	With Cephalometric
0403	308-03972	Fixing Plate (1) for P.C. Board	1	
0404	974-80056-01	Power Supply of 1.0kW High Tension Voltage for Dental Use	1	
0405	408-10743-00	PFC AC FILTER ASSY	1	
0406	408-11758	Fixing Plate for Counter Weight	1	
0407	408-11481	Fixing Plate for Fan	1	
0408	942-60011-05	DC Axis Fan MDS510-24	1	
0409	965-60057-11	JM Relay JM1aN-ZTM-DC24V	1	
0410	408-11478	Balance Weight (C)	1	
0411	408-11759	Balance Weight (D)	1	
0412	408-11482	Fixing Plate (2) for P. C. Board	1	
0413	408-11473	CONTROL ASSY	1	
0414	975-00029-02	Ferrite Core TFT-152613N-03	2	
0415	308-03970	Frame	1	
0416	308-03971	Boss (D)	1	
0417	408-11475	Pressing Plate	4	
0418	408-11476	Fixing Plate for Terminal Table	1	
0419	971-00045-02	Terminal Table (ML-20) ML-20-3P	1	
0420	408-11477	Cover	1	
0421	308-03973-02	Head Swing ASSY	1	Without Cephalometric
0422	923-92004-05	Fine U Nut FU04SC	1	
0423	108-01251	ARM Cover (1)	1	
0424	108-01252	ARM Cover (2)	1	
0425	408-11479-01	ARM Fixing Metal Plate (1)	1	
0426	408-11479-02	ARM Fixing Metal Plate (1)	1	
0427	408-11480	ARM Fixing Metal Plate (2)	2	

4. 1. (402) Head Swing ASSY



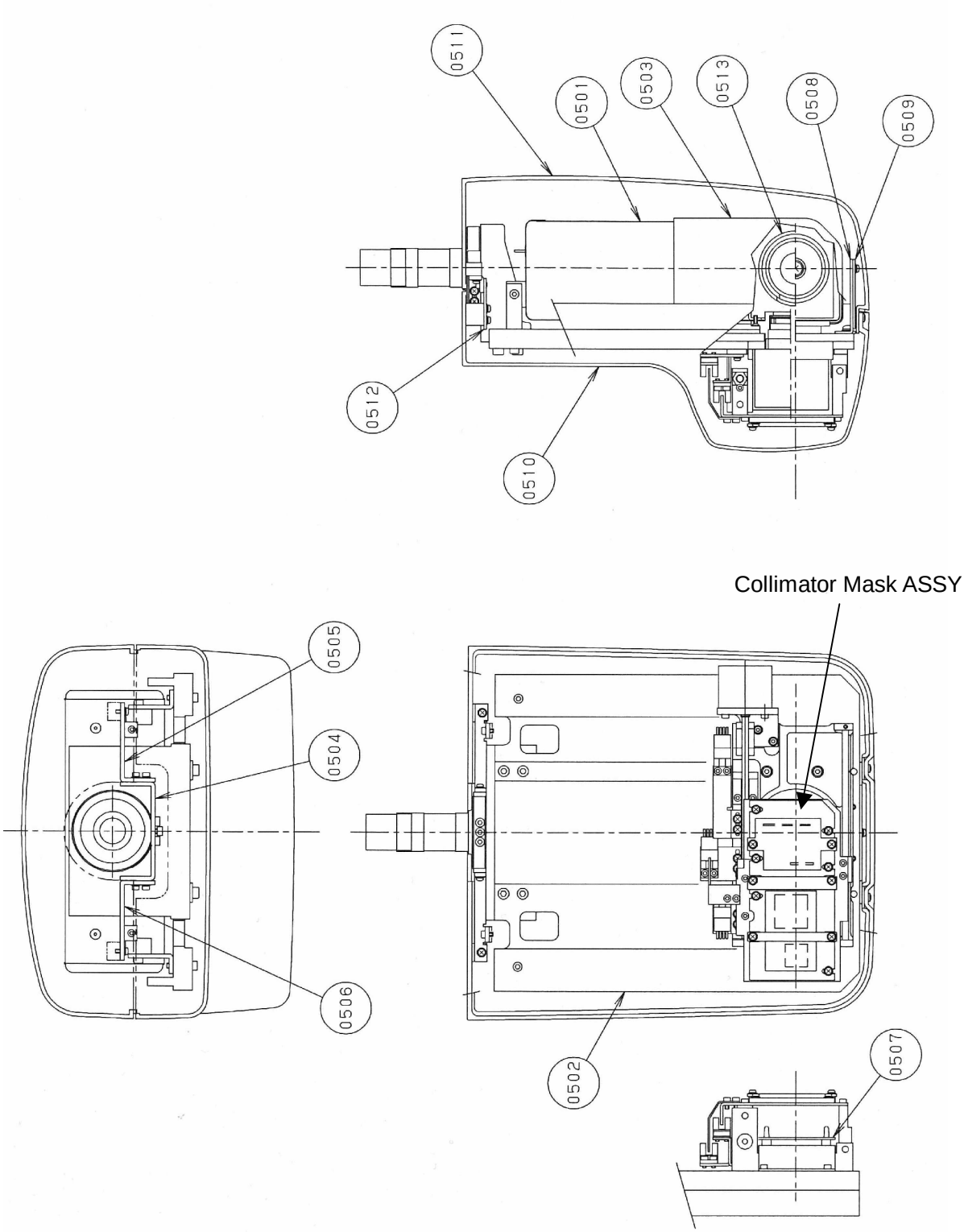
(421) Head Swing ASSY



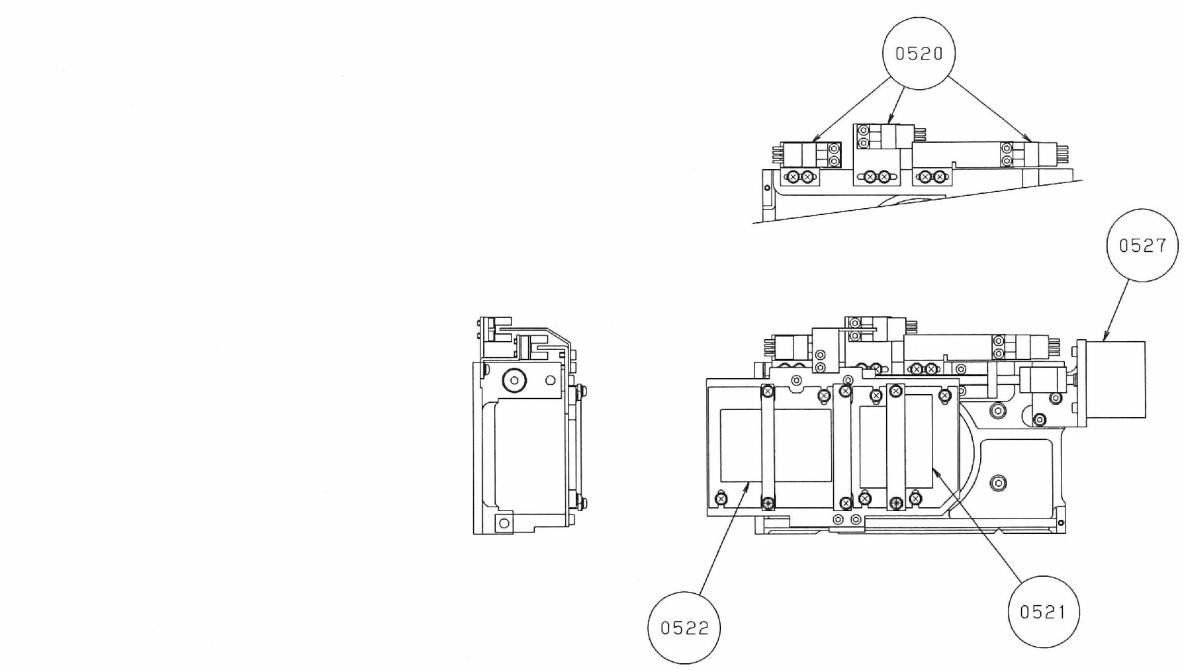
(402) Head Swing ASSY (421)

No.	Drawing Number	Drawing Name	Qty.	Note
0428	208-02156	Base	1	
0429	408-11485	Motor Bracket	1	
0430	977-79031-05	2 phase Stepping Motor PK266M-02A	1	With Cephalometric
0431	408-10414	Additional Processing Drawing (2) for Timing Pulley	1	With Cephalometric
0432	932-21005-18	Timing Belt B 100 S3M 252	1	
0433	408-10415	Additional Processing Drawing (1) For Timing Pulley	1	
0434	408-11499	Angle Plate	1	
0435	408-11500	Sensor Bracket	2	
0436	978-60004-13	Photo-micro Sensor EE-SX674	2	
0437	408-11486	Sensor Fin	1	
0438	408-10902	Plunger Holder	1	
0439	937-50019-26	Plunger PBF-10KN	1	With Cephalometric
0440	-	Hexagon Socket Screw (truncated cone point) M10×25	1	
0441	408-11502	Stopper Table	2	
0442	937-50031-21	Small Plunger PCF-6-BS	2	
0443	920-01010-05	Club Screw SGP-M6-PL L12	2	
0444	408-10420	Fixing Plate	1	with Cephalometric
0445	408-07586-03	BEAM MOTOR BOARD ASSY	1	with Cephalometric
0446	031-60006	Rock Nut AN06	1	
0447	031-60306	Rock Washer AW06	1	
0448	930-00012-07	Bearing 6906ZZ	2	
0449	078-60099	Connector EE-1001	2	

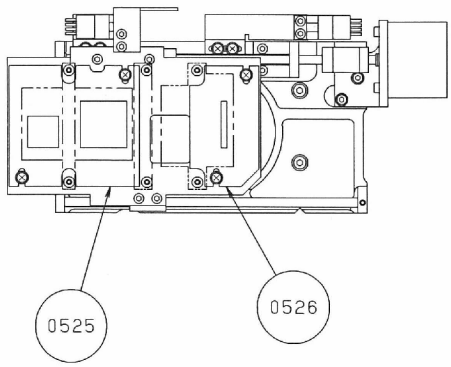
5. X-ray Generator



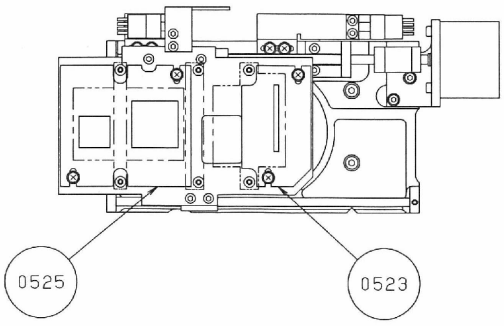
Collimator Mask ASSY



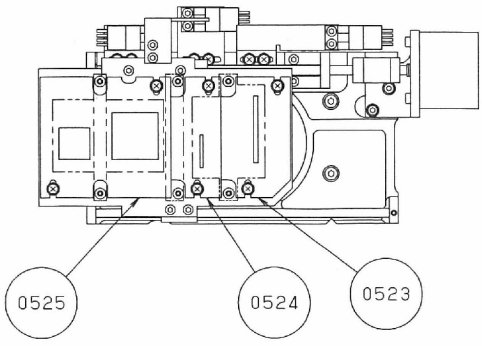
Bel-Cat



Bel-Cat PA



Bel-Cat CM



X-ray Generator

No.	Drawing Number	Drawing Name	Qty.	Note
0501	108-01262-01	Inside Case ASSY	1	
0502	308-04033	Frame	1	
0503	408-10265-01	Lead Plate ASSY	1	
0504	408-11644	Attaching Plate for Cover（4）	1	
0505	408-11643-01	Attaching Plate for Cover（3）	1	
0506	408-11643-02	Attaching Plate for Cover（3）	1	
0507	408-07586-02	BEAM MOTOR BOARD ASSY	1	
0508	408-11641	Attaching Plate for Cover（1）	1	
0509	408-11642	Attaching Plate for Cover（2）	1	
0510	108-01263	Tube Head Cover (Front)	1	
0511	108-01264	Tube Head Cover (Back)	1	
0512	408-11645	Fixing Plate for Cover (5)	2	
0513	962-01016-01	X-ray tube D-052SB	1	

Collimator Mask ASSY

0520	978-60004-13	Photo-micro Sensor EE-SX674	3	
0521	408-11635	Filter (A)	1	
0522	408-11630	Filter (B)	1	
0553	408-11918	Collimator Mask (B) (CCD-P)	1	
0554	408-11632	Collimator Mask (CCD-C)	1	
0555	408-11633	Collimator Mask (FPD-3D)	1	
0526	408-11919	Collimator Mask (B) (FPD-P)	1	
0527	977-79010-05	2 phase Stepping Motor PX243-03A	1	

6. Image Receptor ASSY

FPD Image Receptor ASSY

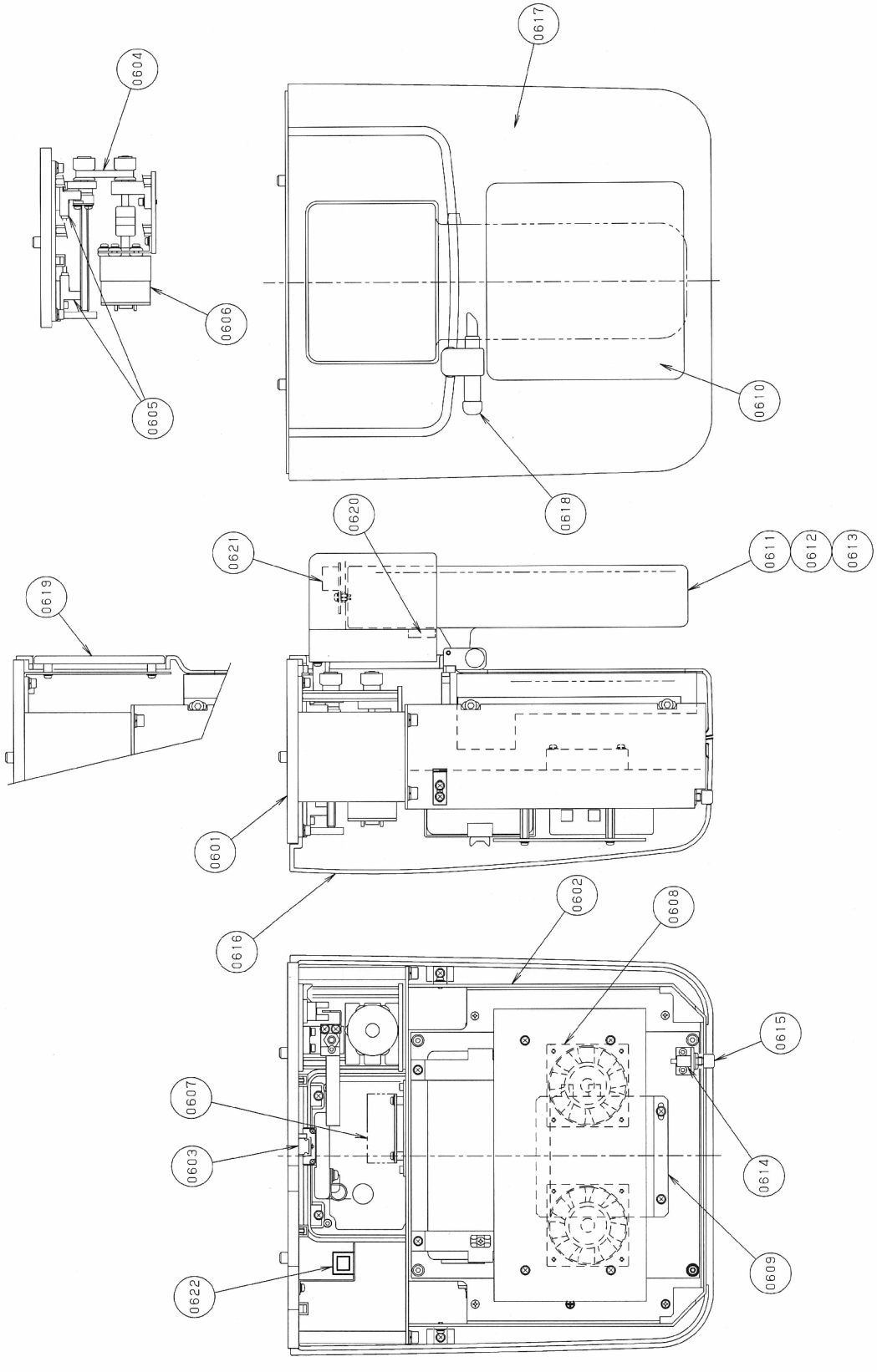


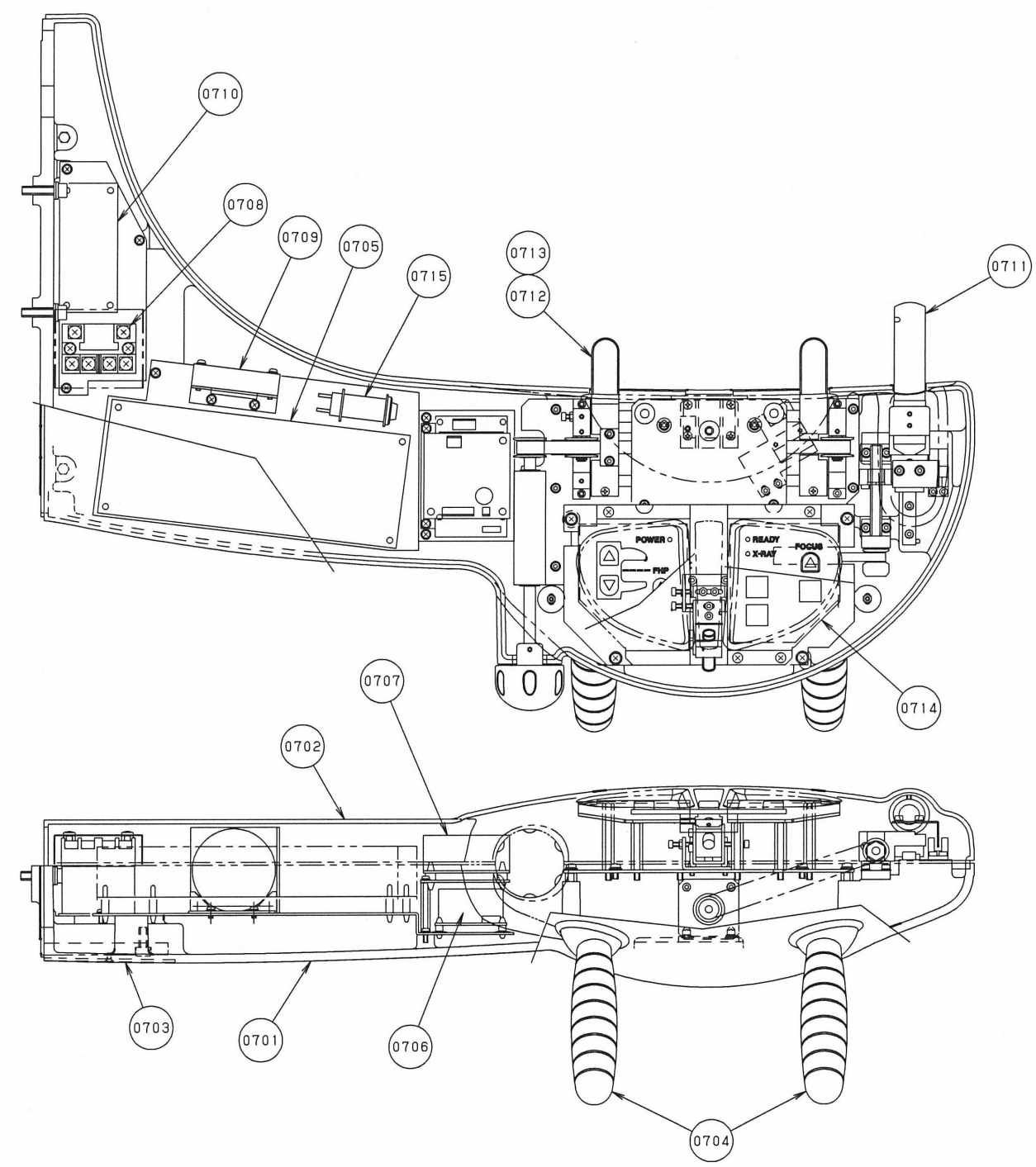
Image Receptor ASSY

FPD Image Receptor ASSY

No.	Drawing Number	Drawing Name	Qty.	Note	
0601	208-02162	Base	1		
0602	208-02163	Frame of Image Receptor	1		
0603	931-70028-02	LM Guide RSR12VMuu+120LM	1		
0604	932-21001-05	Timing Belt B40S2M100	1		
0605	978-60004-13	Photo-micro Sensor EE-SX674	2		
0606	977-60002-01	Geared Motor TG-0301A-SG 1/5	1		
0607	408-09220	DC-DC CONVERTER BOARD ASSY	1		
0608	942-60022-07	Fan KDE2406PHV2	2		
0609	988-50129	Conversion Adaptor for Image Obtaining PT1000-CL	1		
0610	988-50131	FPD VALIAN1313	1		
0611	-	—	—		Alternative
0612	988-50054-01	Digital Sensor（CCD Sensor）	1	PANO (PA)	
0613	988-50123	Digital Sensor（CCD Sensor）	1	PANO/CEPH (CM)	
0614	964-50060-02	Push Button Switch MB-2511G	1		
0615	964-50031-01	Color Cap AT-442-W	1		
0616	208-02165	Cover of Image Receiver (Back)	1		
0617	208-02164	Cover of Image Receiver (Front)	1		
0618	408-11490-00	Hook ASSY	1		
0619	408-11507	Blind Board ASSY	1		
0620	978-60007-01	Photo-micro Sensor EE-SY671	1		
0621	408-10450	CNP BOARD ASSY	1		
0622	988-50047	Relay Adopter for STP NWSI-C5E-SH	1		

* Bel-Cat does not have Digital Sensor.

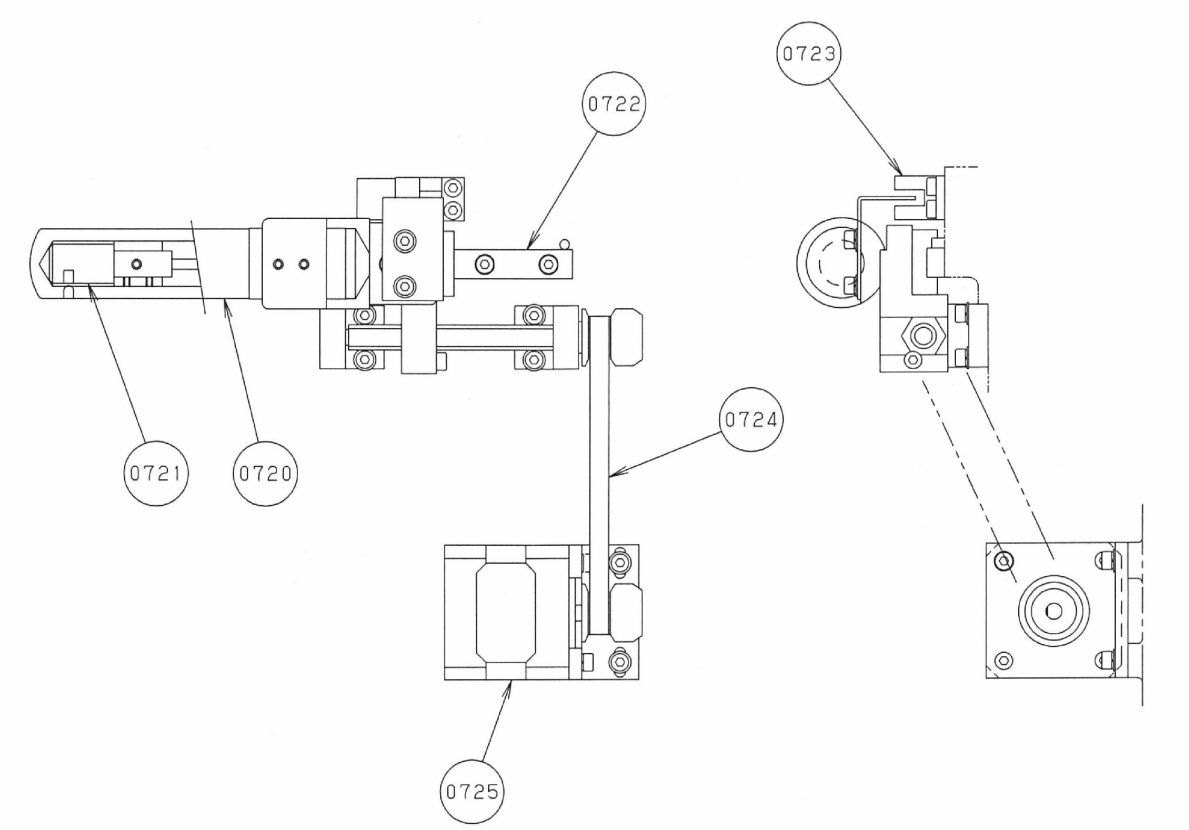
7. Rest Unit ASSY



Rest Unit ASSY

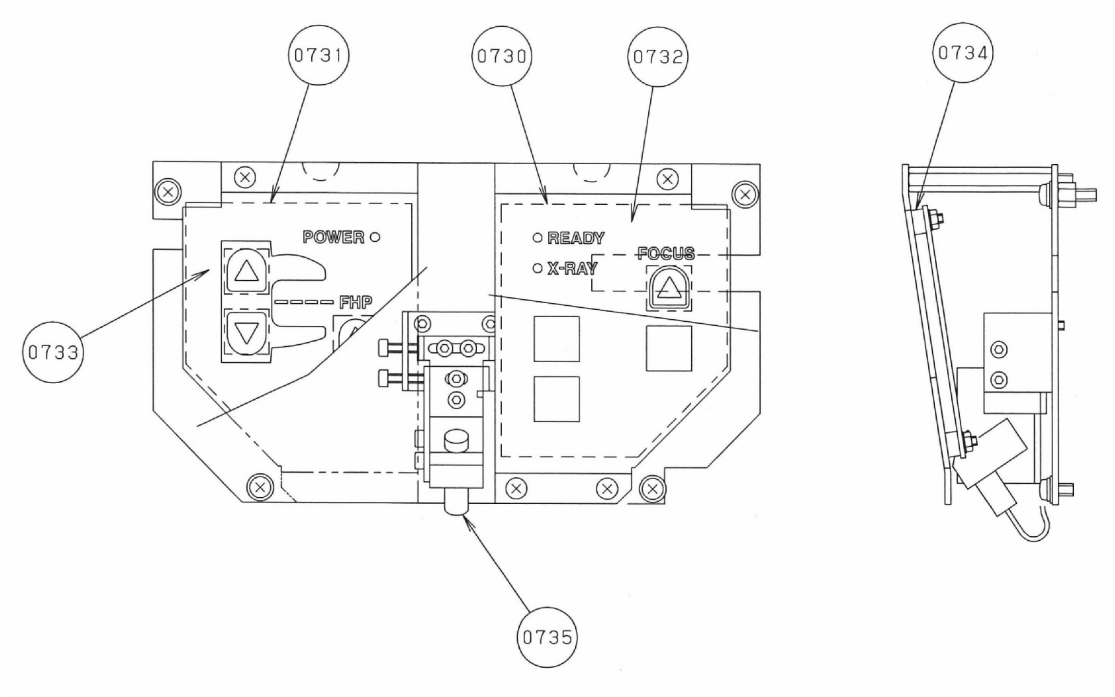
No.	Drawing Number	Drawing Name	Qty.	Note
0701	108-01266	Chinrest Main Body	1	
0702	108-01267	Chinrest ASSY Cover	1	
0703	408-11699	Cover	1	
0704	308-04055	Grip (Handle)	1	
0705	974-80072	DC Power Supply CME150-24	1	
0706	408-10584-01	DC POWER 1 ASSY	1	
0707	408-07586-01	BEAM MOTOR BOARD ASSY	1	
0708	965-60065-01	Relay HE2aN-S-DC24(HAE2232)	1	
0709	942-60022-07	Fan KDE2406PHV2	1	
0710	408-11383	CNKI BOARD ASSY	1	
0711	308-04049	Indicator ASSY	1	
0712	932-21015-01	Power Grip GT Belt 495-3GT-9	1	
0713	308-04042	Operation Panel ASSY	1	
0714	978-60005-02	Photo-micro Sensor EE-SPX403	1	
0715	965-85012-03	Circuit Protector NRF110-1A	1	

7. 1. (0711) Indicator ASSY



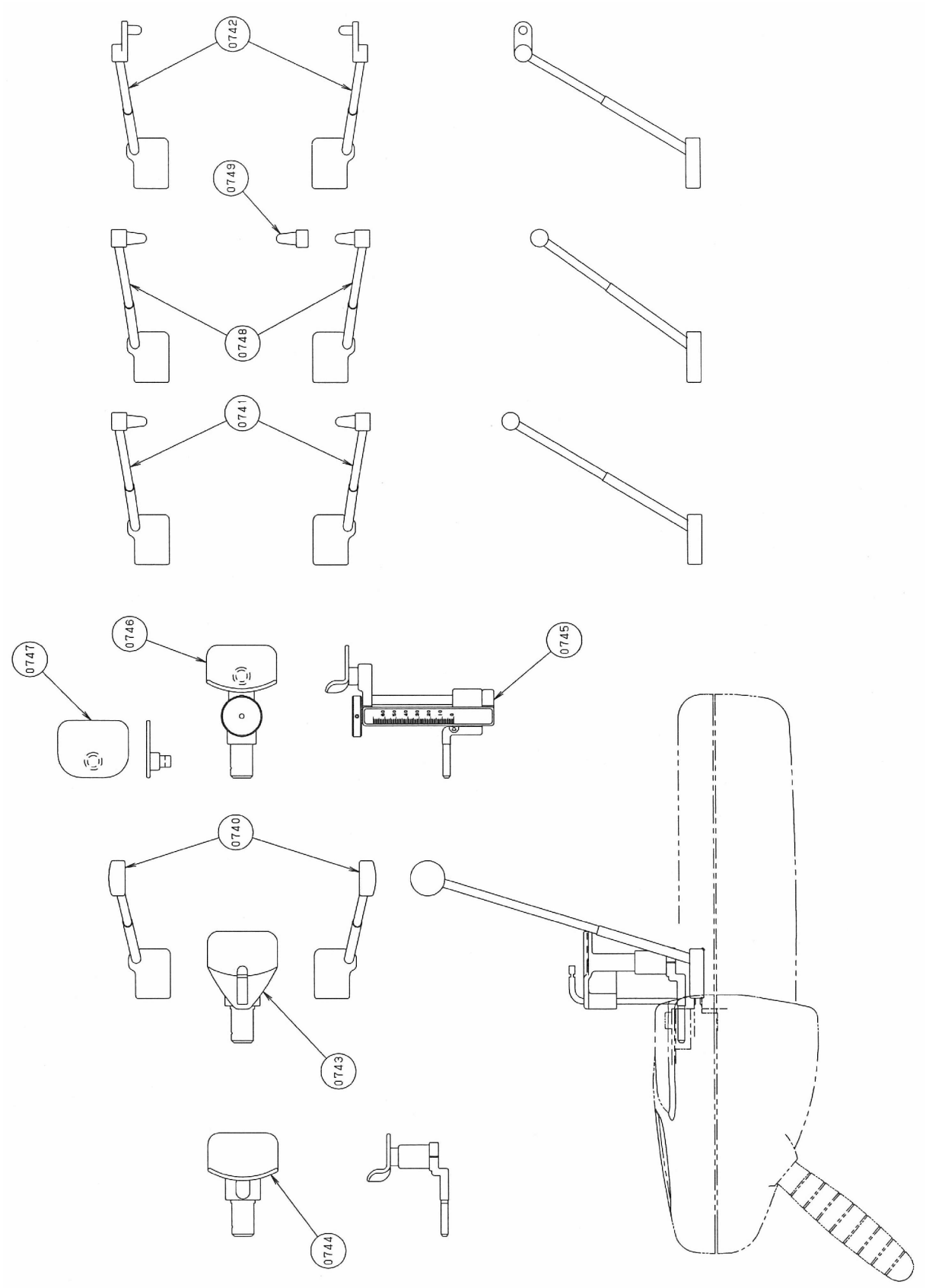
No.	Drawing Number	Drawing Name	Qty.	Note
0720	408-11681	Holder	1	
0721	962-05006	Laser Marking Projector LDV167LS	1	
0722	931-70026-01	LM Guide RSR9KMuu+75LM	1	
0723	978-60004-13	Photo-micro Sensor EE-SX674	1	
0724	932-21002-80	Timing Belt B60S2M292	1	
0725	977-79007-07	2 phase stepping Motor PK244-04A	1	

7. 2. (0713) Operation Panel ASSY



No.	Drawing Number	Drawing Name	Qty.	Note
0730	408-11379	PANEL-R BOARD ASSY	1	
0731	408-11378	PANEL-L BOARD ASSY	1	
0732	408-11655	Membrane Sheet (R)	1	
0733	408-11656	Membrane Sheet (L)	1	
0734	408-07144	Spacer	1	
0735	962-05008	Laser Marking Projector LDV167LA	1	

7. 3. Head Holding Rod, Ear Rod, and each Chinrest

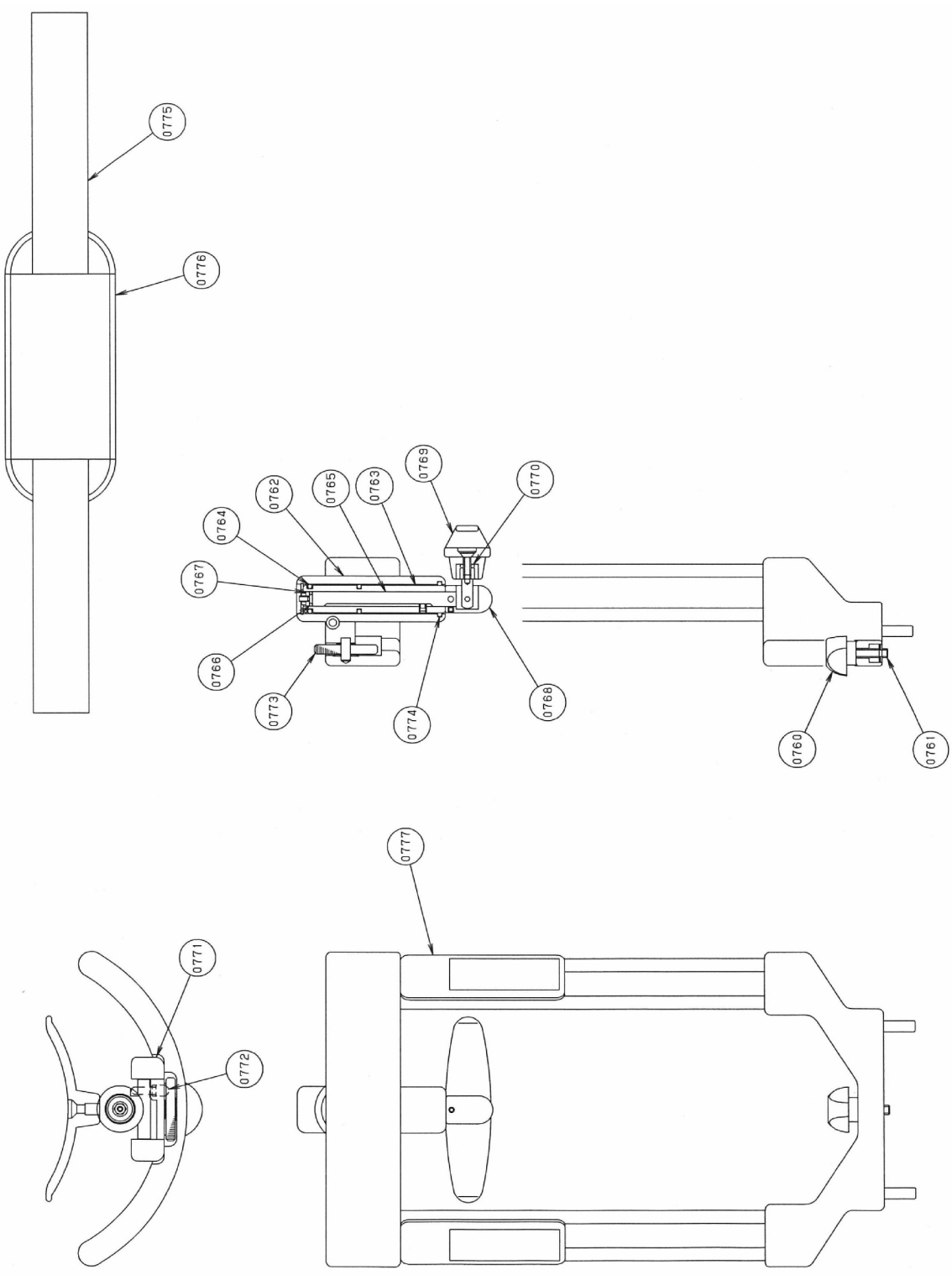


HEAD HOLDIONG ROD, EAR ROD each CHINREST

No.	Drawing Number	Drawing Name	Qty.	Note
0740	308-04056-01 308-04056-02	Head Holding Rod ASSY (Right) Head Holding Rod ASSY (Left)	1 1	
0741	308-03889-01 308-03889-02	Ear Rod ASSY (Right) Ear Rod ASSY (Left)	1 1	
0742	308-04057-01 308-04057-02	Ear Rod (TMJ2) ASSY (Right) Ear Rod (TMJ2) ASSY (Left)	1 1	
0743	408-11704	Rest ASSY for Bite	1	
0744	408-11705	Rest ASSY for MS (Maxillary Sinus)	1	
0745	308-04067-02	Chinrest ASSY for CT	1	
0746	408-11401	Chinrest	1	
0747	408-11402	Chinrest for TMJ	1	
0748	308-04068-01 308-04068-02	Ear Rod (CT-TMJ) ASSY (Right) Ear Rod (CT-TMJ) ASSY (Left)	1 1	
0749	408-11819	Rod Adaptor	1	

* Bel-Cat does not have (0742) and (0744).

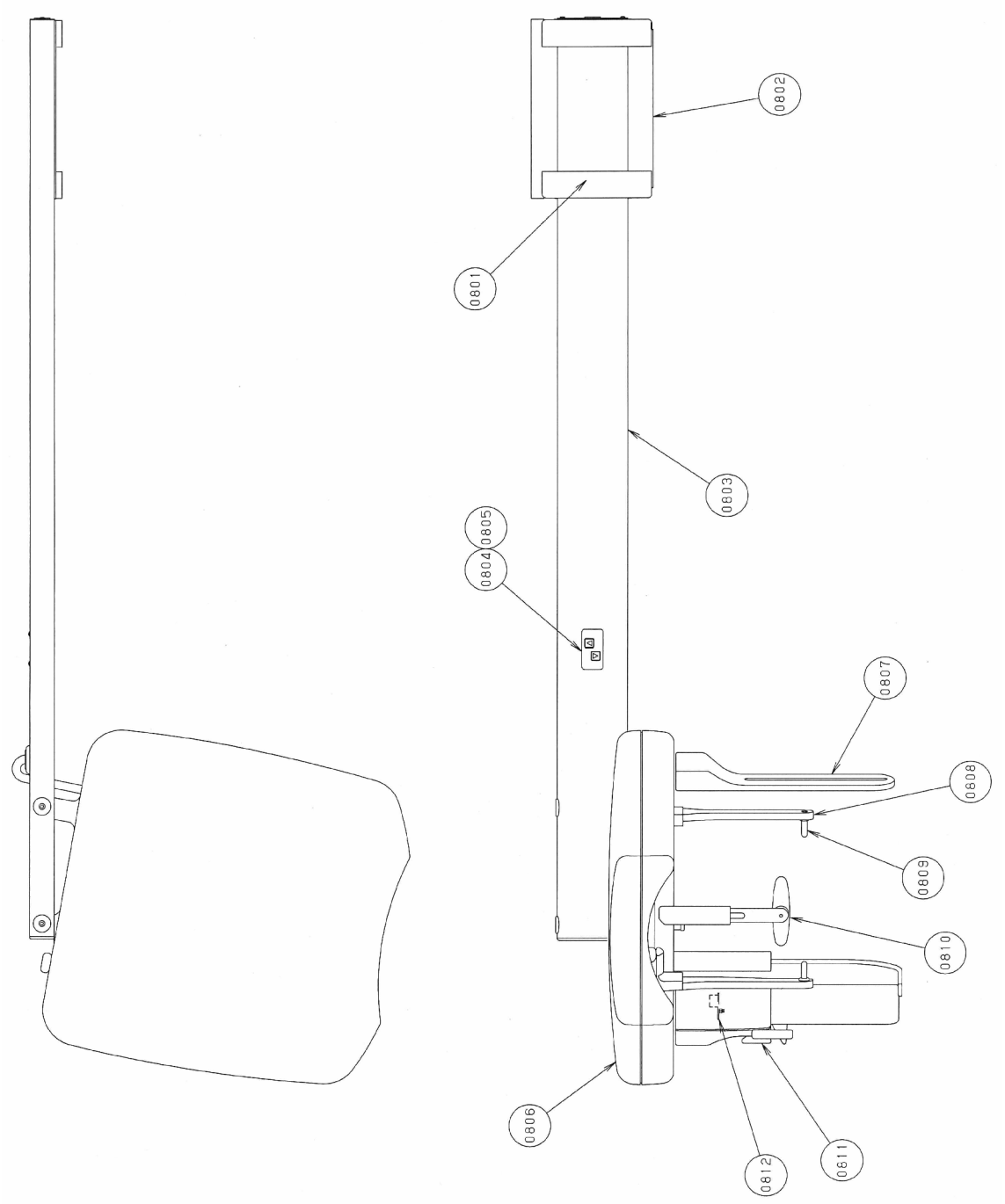
7. 4. Head Support



Head Support

No.	Drawing Number	Drawing Name	Qty.	Note
0760	937-03042-26	KVDF-25-M5-BK	1	
0761	408-11697	Screw Bar	1	
0762	308-04054	Rotation Body	1	
0763	408-11689	Slider	1	
0764	036-10213	O Ring 1A P12	2	
0765	408-11690	Slid Shaft	1	
0766	936-12002-03	O Ring 4C P5	1	
0767	-	Nylon Nut	1	
0768	408-11691	Block	1	
0769	308-02467	Forehead Rest	1	
0770	036-10202	O Ring 1A P4	1	
0771	408-11693	Supporting Body	1	
0772	408-11695	Shaft D	1	
0773	408-11696	Helical Knob	1	
0774	036-10216	O Ring 1A P15	1	
0775	408-09149-01	Belt	1	
0776	408-11657	Occipital Pad	1	
0777	408-11794	Tape Table	2	

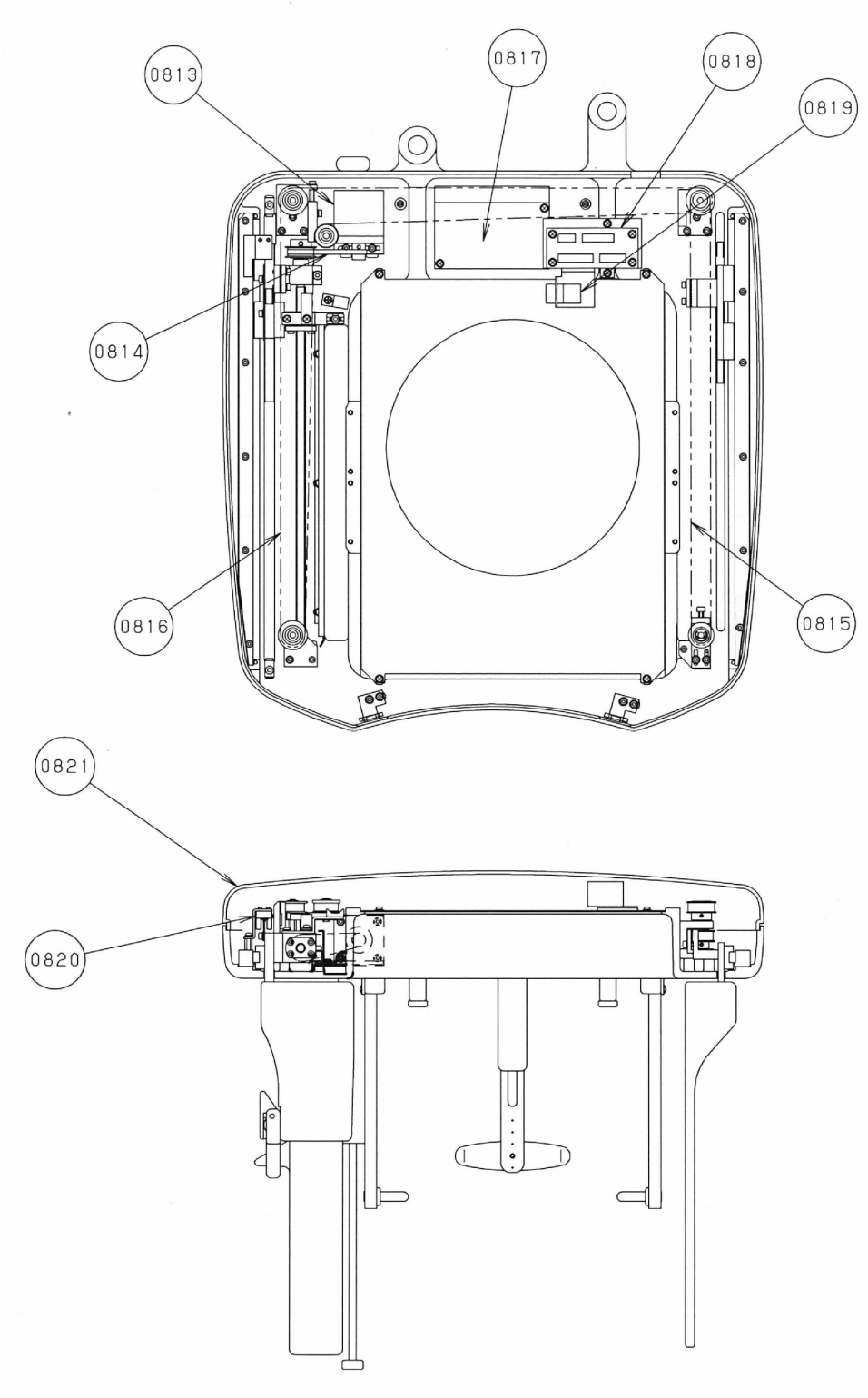
8. Cephalometric Device ASSY



Cephalometric Device ASSY

No.	Drawing Number	Drawing Name	Qty.	Note
0801	408-11534	Cephalometric Fixing Plate (2)	2	
0802	408-11533	Cephalometric Fixing Plate (1)	1	
0803	208-02167	Cephalometric ARM	1	
0804	408-11459	Membrane Sheet (CM)	1	
0805	408-10162	CM SW BOARD ASSY	1	
0806	208-02168	Cephalometric Driving ASSY	1	
0807	308-03996-01	Secondary Slit (B) ASSY	1	
0808	408-11547	Ear Rod ARM	2	
0809	408-05028	Ear Rod	2	
0810	308-03627-01	Forehead Rest (2) ASSY	1	
0811	308-03937	Sensor Hook ASSY	1	
0812	408-10450	CNP BOARD ASSY	1	

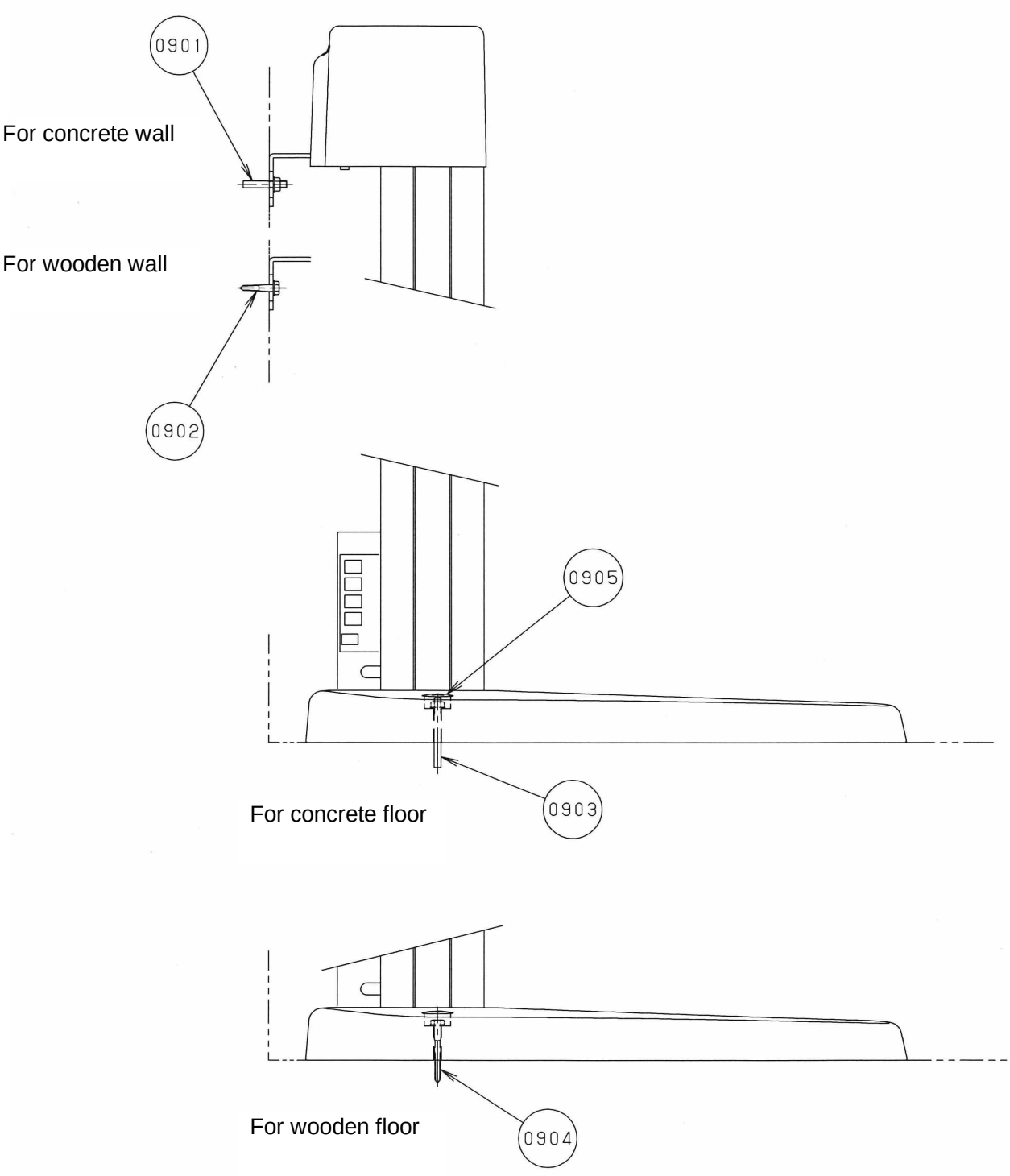
8. 1. (806) Cephalometric Driving ASSY



(806) Cephalometric Driving ASSY

No.	Drawing Number	Drawing Name	Qty.	Note
0813	977-79029-03	5 phase Stepping Motor CFK544AP2	1	
0814	932-21025-01	Timing Belt 152-2GT-6	1	
0815	932-21025-02	Timing Belt 800-2GT-6	1	
0816	932-21023-01	Timing Belt 1482-2GT-6	1	
0817	408-10631-00	Driver ASSY	1	
0818	408-11384	CNM BOARD ASSY	1	
0819	988-50047	Relay Adaptor for STP NWSI-C5E-SH	1	
0820	978-60004-13	Photo-micro Sensor EE-SX674	1	
0821	108-01255	Cephalometric Cover	1	

9. Anchor Bolt for fixing



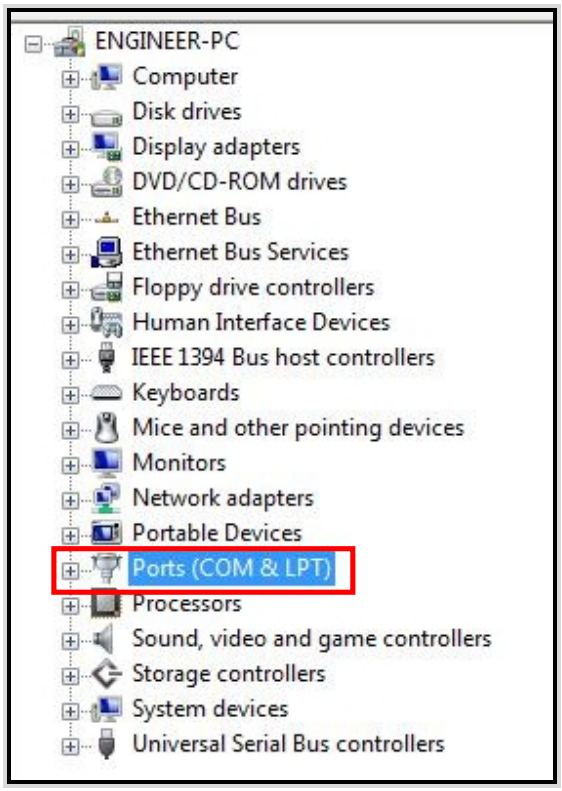
Anchor Bolt for fixing

No.	Drawing Number	Drawing Name	Qty.	Note
0901	926-29003-11	High Anchor C8-50	2	Select one
0902	926-29005-12	Coach Screw φ8×40	2	
0903	926-29003-13	High Anchor C8-80	2	Select one
0904	929-29005-16	Coach Screw φ8×65	2	
0905	972-40002-17	Hall Plug	2	

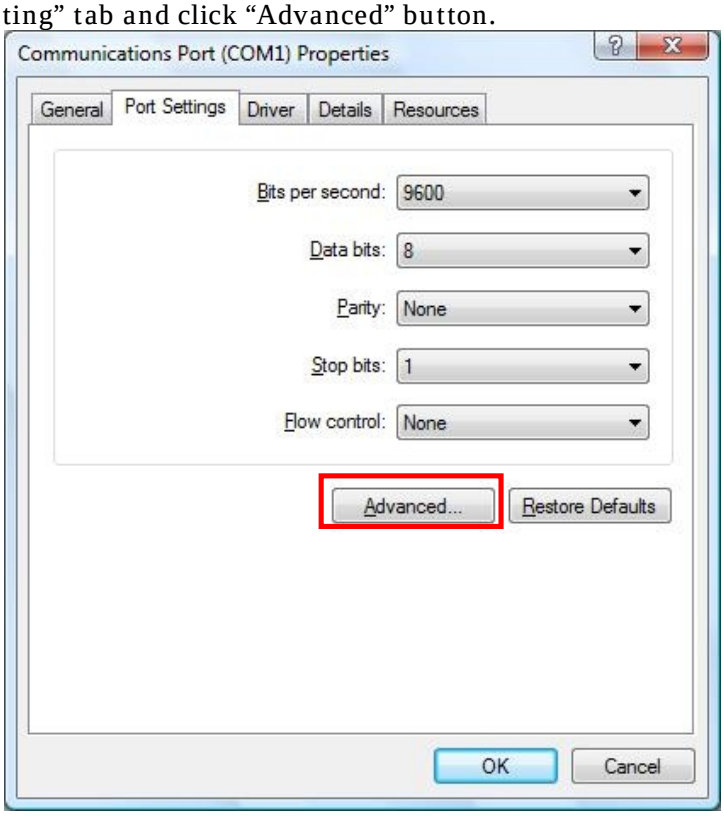
08. CCD Sensor Replacement Manual

1. Required items:
   (1)CCD Sensor Calibration Jig (582-00979)
   (2)Sensor Calibration Jig Installation Base (582-00968)
   (3)Sensor Damage Correction file (Attached in the Sensor CD)
   (4)AUGE CCD Sensor Calibration Software Installer

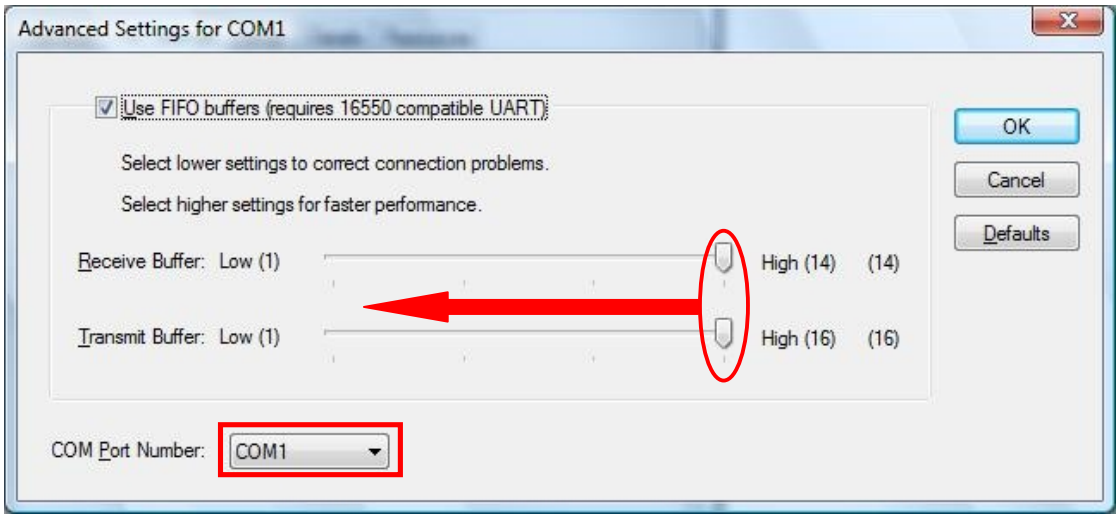
2. Port Setting (Windows Vista and Windows 7):
   (1)Open Device Manager from the Control Panel.
   (2)Expand "Ports "COM & LPT", right-click on the Communications Port, select "Properties" from the right-click menu.



(3)Select “Port Setting” tab and click “Advanced” button.

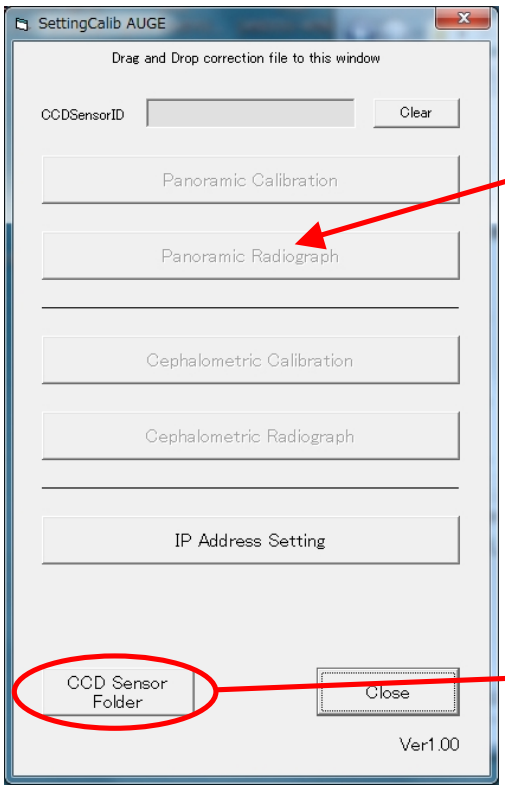


(4)The window as shown below will be displayed. Change the Receive Buffer and Transmit Buffer to Low. For the COM Port Number, if the selected number is not “COM1” change the number to “COM1”.

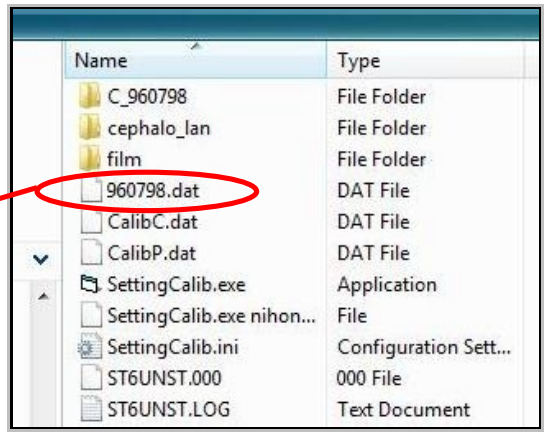


3. Copying Damage Correction File

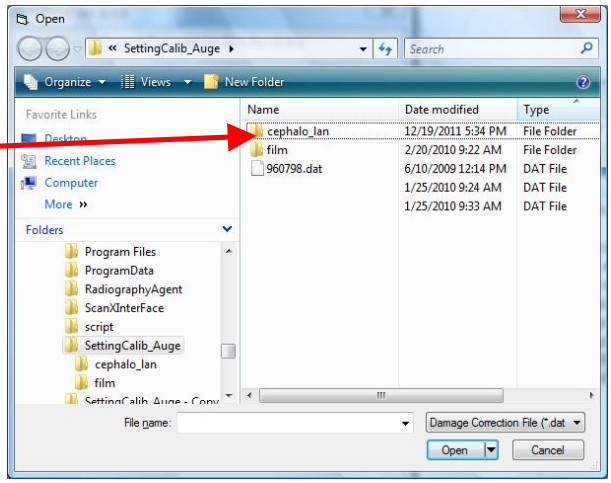
(1)Execute item 1-(4) and install AUGE CCD Sensor Calibration Software.
(2)Execute C:¥SettingCalib_Auge¥SettingCalib.exe.
(3)Specify the Damage Correction file (******.dat) from the Sensor CD. There are 2 methods to specify the file, please follow the instruction below. The ****** in the file name is the Sensor Number.



Method 1:
Drag the file from the windows explorer and drop it to the calibration software.

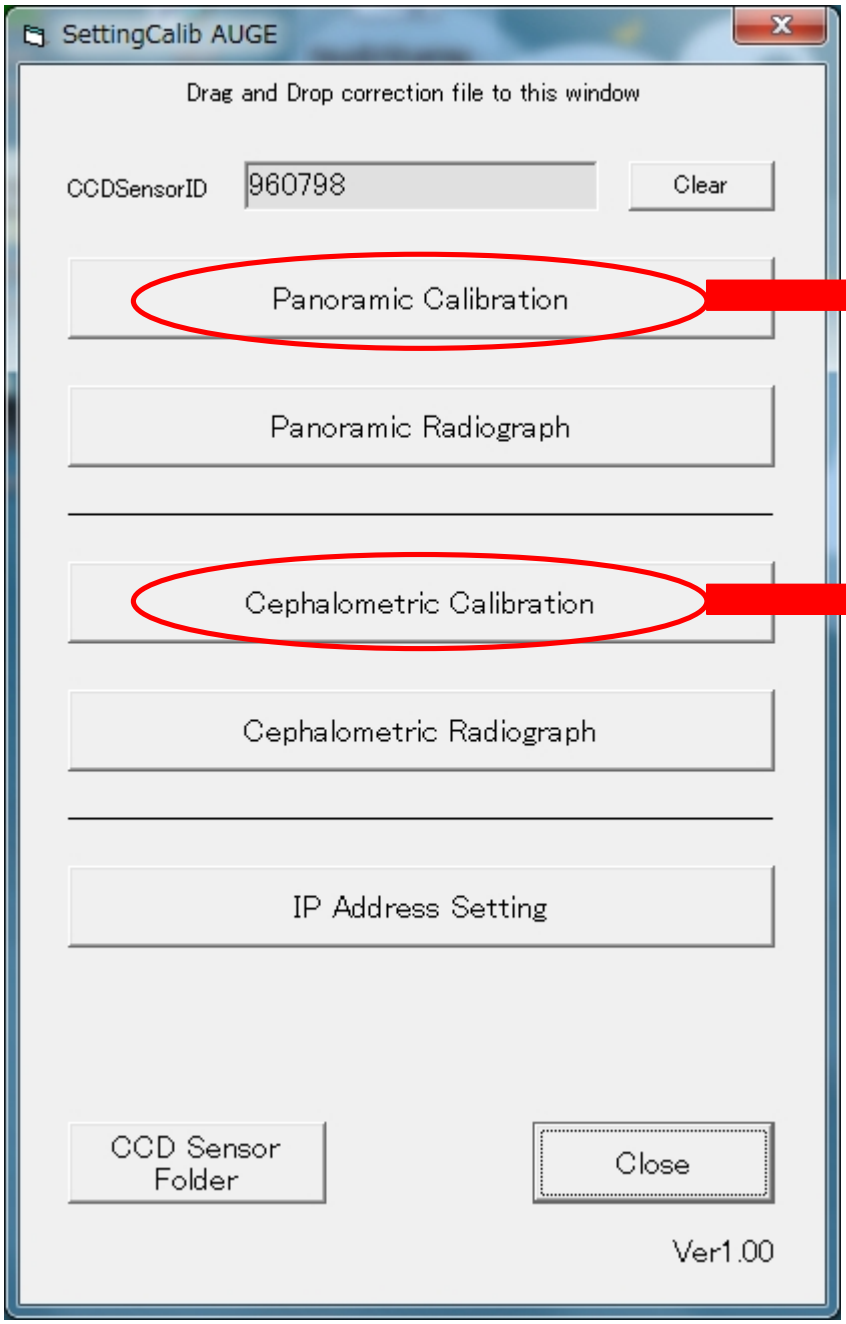


Method 2:
Click the “Sensor Folder” button and Find the Damage Correction file.



At this moment, the Damage Correction file will be copied automatically to the “C_(Sensor ID)” folder in the SettingCalib_Auge folder.

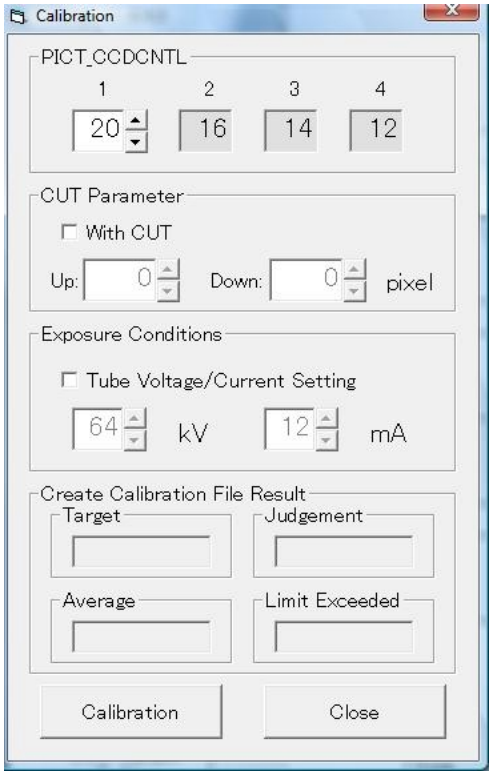
(4)If the damage correction file is copied correctly, the buttons as shown below will be available.



Panoramic Calibration Button
(See Section 4:
Panoramic Calibration)

Cephalometric Calibration Button
(See Section 5:
Cephalometric Calibration)

4. Panoramic Calibration.



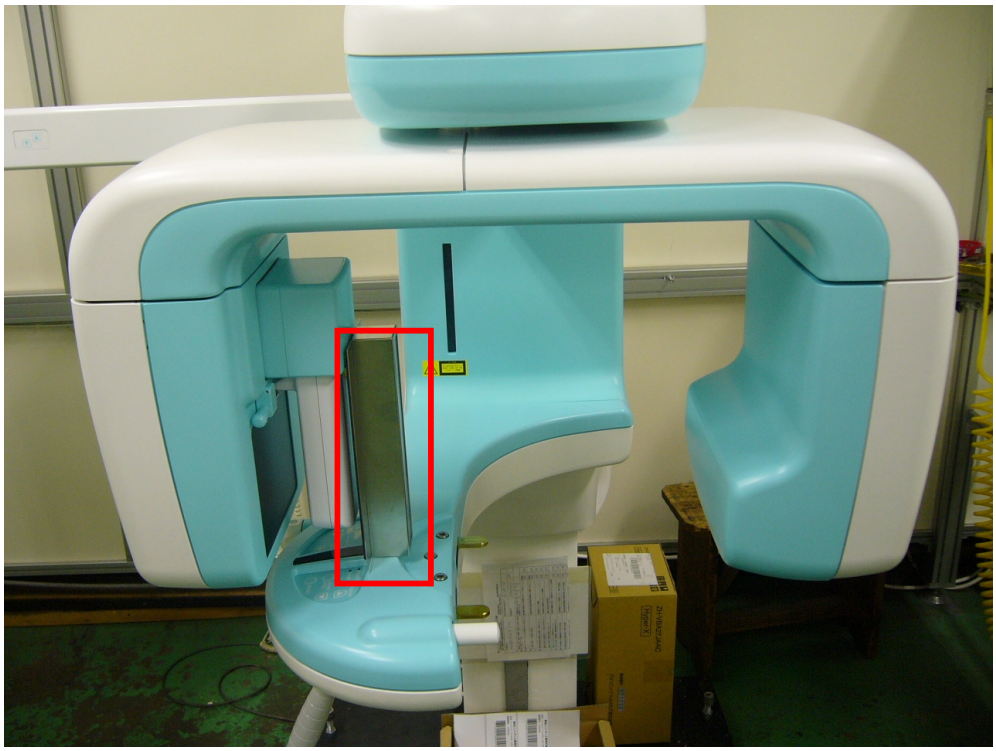
When “Panoramic Calibration” button clicked, the window above will be displayed.
Please follow the instructions below to create calibration data:

(1)Open C:¥Program Files¥AsahiRoentgen¥AUGE_LINK¥AUGE_CCD.ini file and please remember the following values.

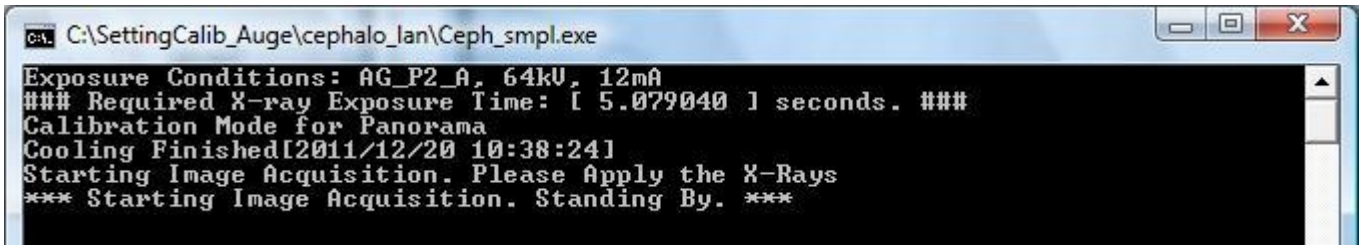
File	C:¥Program Files¥AsahiRoentgen¥AUGE_LINK¥AUGE_CCD.ini
Values to be noted	[IMAGE_CUT] Cut_Top=0 Cut_Bottom=0 Cut_Left=0 Cut_Right=0

(2)Put a check in the “With CUT” checkbox in “CUT Parameter” option; insert the “Cut_Top” value in the “Up”, and “Cut_Bottom” value in the “Down” entry field.

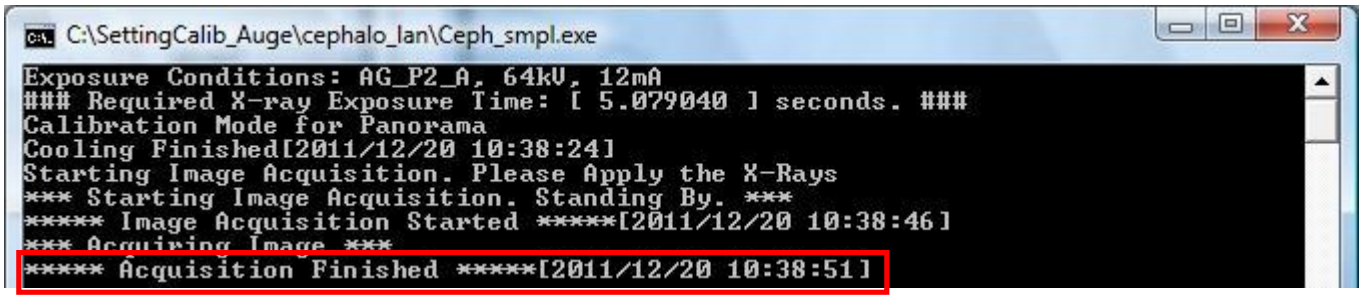
(3)Set the Arm Unit position, and then set the 1-(1) CCD Sensor Calibration Jig vertically on the Rest Unit (Operation Panel Base) of the panoramic side as shown below.
Be sure to cover the sensor completely with the Calibration Jig, set the exposure condition to 64kV for the Voltage and 12mA for the Current.



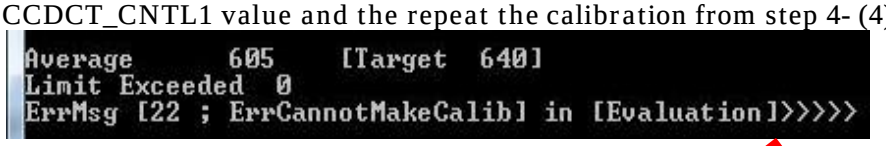
(4)Click the “Calibration” button, messages as shown below will be displayed, press the X-ray Exposure Switch to irradiate the X-ray

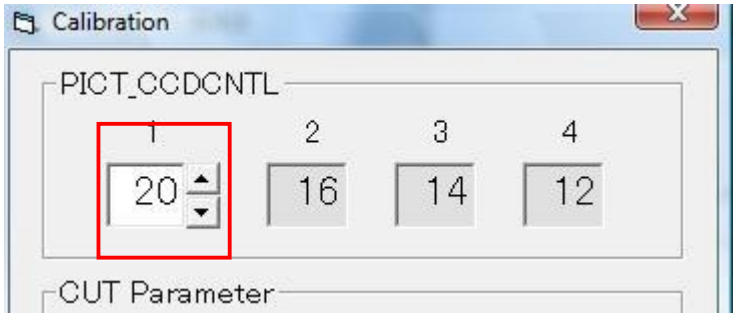

C:\SettingCalib_Auge\cephalo_Ian\Ceph_smpl.exe
Exposure Conditions: AG_P2_A, 64kV, 12mA
Required X-ray Exposure Time: [5.079040] seconds.
Calibration Mode for Panorama
Cooling Finished[2011/12/20 10:38:24]
Starting Image Acquisition. Please Apply the X-Rays
*** Starting Image Acquisition. Standing By. ***

(5)When the message below is displayed, release the switch to stop the X-ray immediately, wait for the result.


C:\SettingCalib_Auge\cephalo_Ian\Ceph_smpl.exe
Exposure Conditions: AG_P2_A, 64kV, 12mA
Required X-ray Exposure Time: [5.079040] seconds.
Calibration Mode for Panorama
Cooling Finished[2011/12/20 10:38:24]
Starting Image Acquisition. Please Apply the X-Rays
*** Starting Image Acquisition. Standing By. ***
***** Image Acquisition Started *****[2011/12/20 10:38:46]
*** Acquiring Image ***
***** Acquisition Finished *****[2011/12/20 10:38:51]

(5)If the Average value result is below the Target, the calibration failed. Increase the PICCDCT_CNTL1 value and the repeat the calibration from step 4- (4).



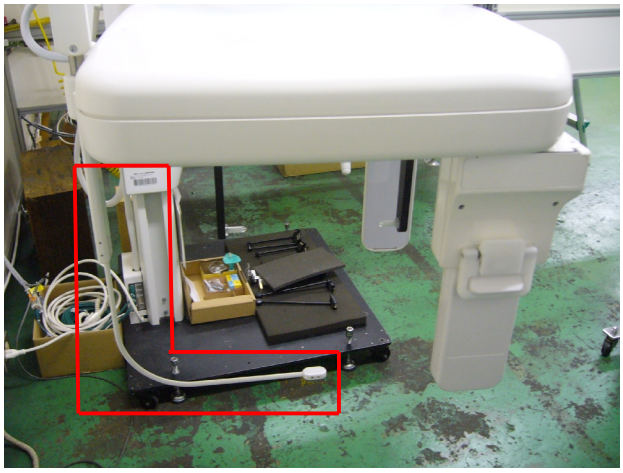


Reconfigure the "PICT_CCDCNTL1" value. Repeat from step 4-(4) again.

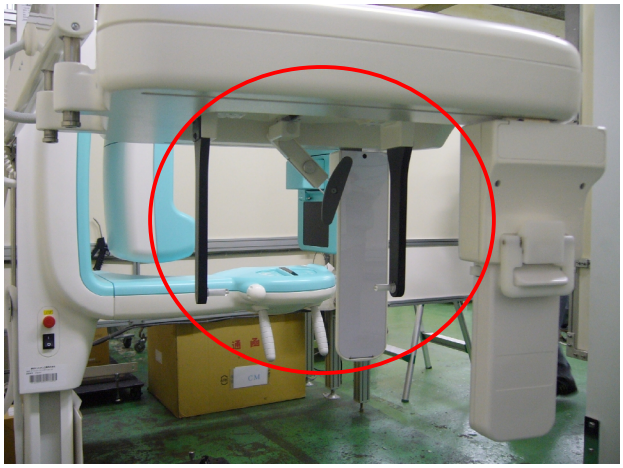
(6)If the calibration succeeds, the message below will be displayed. The calibration file "calibP.dat" will be created in the "C_(Sensor ID)" folder.
*If the Average value exceeds Target value by 50 or more, decrease the PICT_CCDCNTL1 value and the repeat the calibration from step 4- (4).

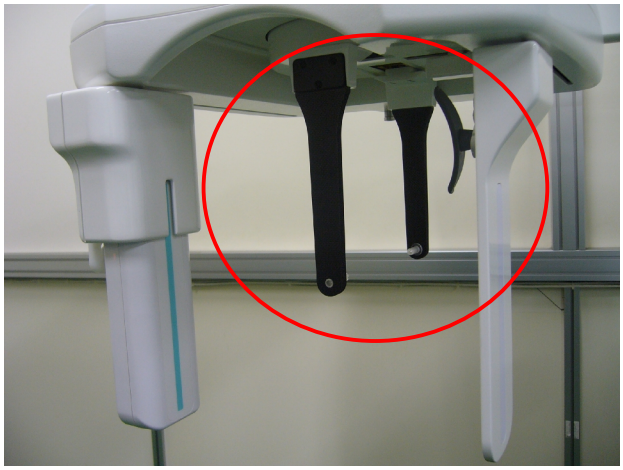
5. Cephalometric Calibration

(1)Remove the Guard Rod.

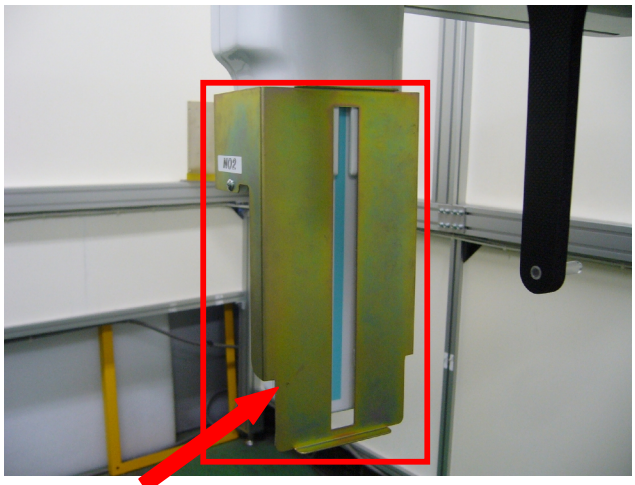


(2)Move the Ear Rods and the Forehead Rest as shown below thus the Ear Rods and the Forehead Read would not block the X-rays.

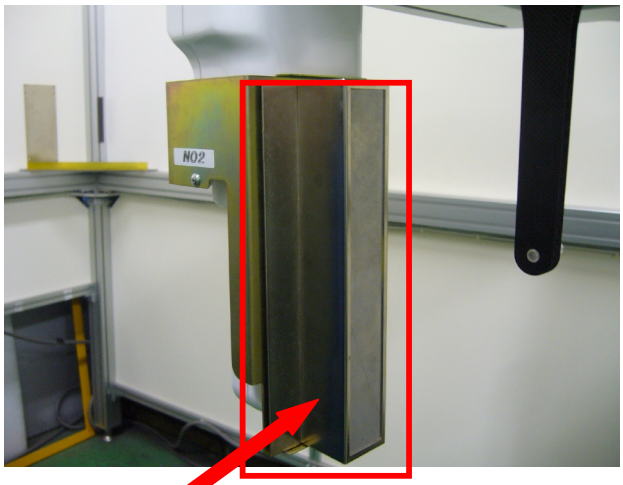




(3)Attach the sensor to the cephalometric side, set up the 1-(2) Sensor Calibration Jig Installation Base and 1-(1) CCD Sensor Calibration Jig as shown below.



Sensor Calibration Jig Installation Base



Sensor Calibration Jig

(4)Open C:¥Program Files¥AsahiRoentgen¥AUGE_LINK¥AUGE_CCD.ini file and please remember

the following values.

File	C:¥Program Files¥AsahiRoentgen¥AUGE_LINK¥AUGE_CCD.ini
Values to be noted	[IMAGE_CUT_CEPH] Cut_Top=0 Cut_Bottom=0 Cut_Left=0 Cut_Right=0

*Be sure to check the cephalometric values, not the panoramic ones.

(5)Click the “Cephalometric Calibration” button.

(6)Put a check in the “With CUT” checkbox in “CUT Parameter” option; insert the “Cut_Top” value in the “Up”, and “Cut_Bottom” value in the “Down” section.

(7)Repeat the similar procedure as shown in the section 4. However, set the exposure condition to 95kv for the Voltage and 12mA for the Current. If the calibration succeeds, similar to the panoramic, this time “calibC.dat” file will be created in the “C_(Sensor ID)” folder.

(8)Re-attach the Guard Rod which was removed in step 5-(1).

6. Radiation Field Width Distribution Calibration

If the X-ray radiation field's right and left distribution is not adjusted properly (equally), calibrate the distribution by adjusting following item.

*By inserting number in pixel unit to DEFAULTOFFSET, the acquired image on screen will be shifted to the right. Negative value cannot be applied.

File	C:¥SettingCalib_Auge¥cephalo_lan¥cephalo_prm.ini
Item to be adjusted	[CORRINGSIZE] ... DEFAULTOFFSET= ...

7. Final Verification

(1)Copy all of the calibP.dat, calibC.dat, and Damage Correction file which is created in the C_(Sensor ID) folder to the C:¥Program Files¥AsahiRoentgen¥AUGE_LINK folder.

(2)Open the AUGE_CCD.ini in C:¥Program Files¥AsahiRoentgen¥AUGE_LINK folder and then complete following items:

```
...
[CORRINJLINE]
//傷補正用データファイル名
#Data File Name for damage correction
CORRLINEDATA=C:¥Program Files¥AsahiRoentgen¥AUGE_LINK¥
...

[CORRIMGSIZE]
//サイズ変更用パラメータ
#Parameter for changing size
DEFAULTOFFSET=
...
```

Insert Damage Correction File's name

Insert adjustment value

09. Contact Information

Please contact our sales office or a distributor near you.

Belmont Equipment
A Division of TAKARA BELMONT USA, Inc.
101 Belmont Drive
Somerset, NJ 08873
Toll Free (800) 223-1192
Toll Free Fax (800) 280-7504
www.belmontequip.com

TAKARA COMPANY, CANADA, LTD.
2706 South Sheridan Way
Mississauga, Ontario, Canada L5J 2M4
Toll Free (800) 268-5351
Fax (905) 822-6203
www.takarabelmont.ca

10. Service Maintenance

⚠ Warning
It is danger to open the covers of the equipment at time of the maintenance. **Do not open any covers of the equipment excepting the maintenance dealer.**

Specialized knowledge, experience and special measuring instruments are required to check this equipment.
To maintain the performance of equipment, please perform daily check (with eyes) and implement periodic maintenance by dealer service personnel.

Maintenance List for Dental X-ray Equipment
Maintenace by maintenance dealer: once a year

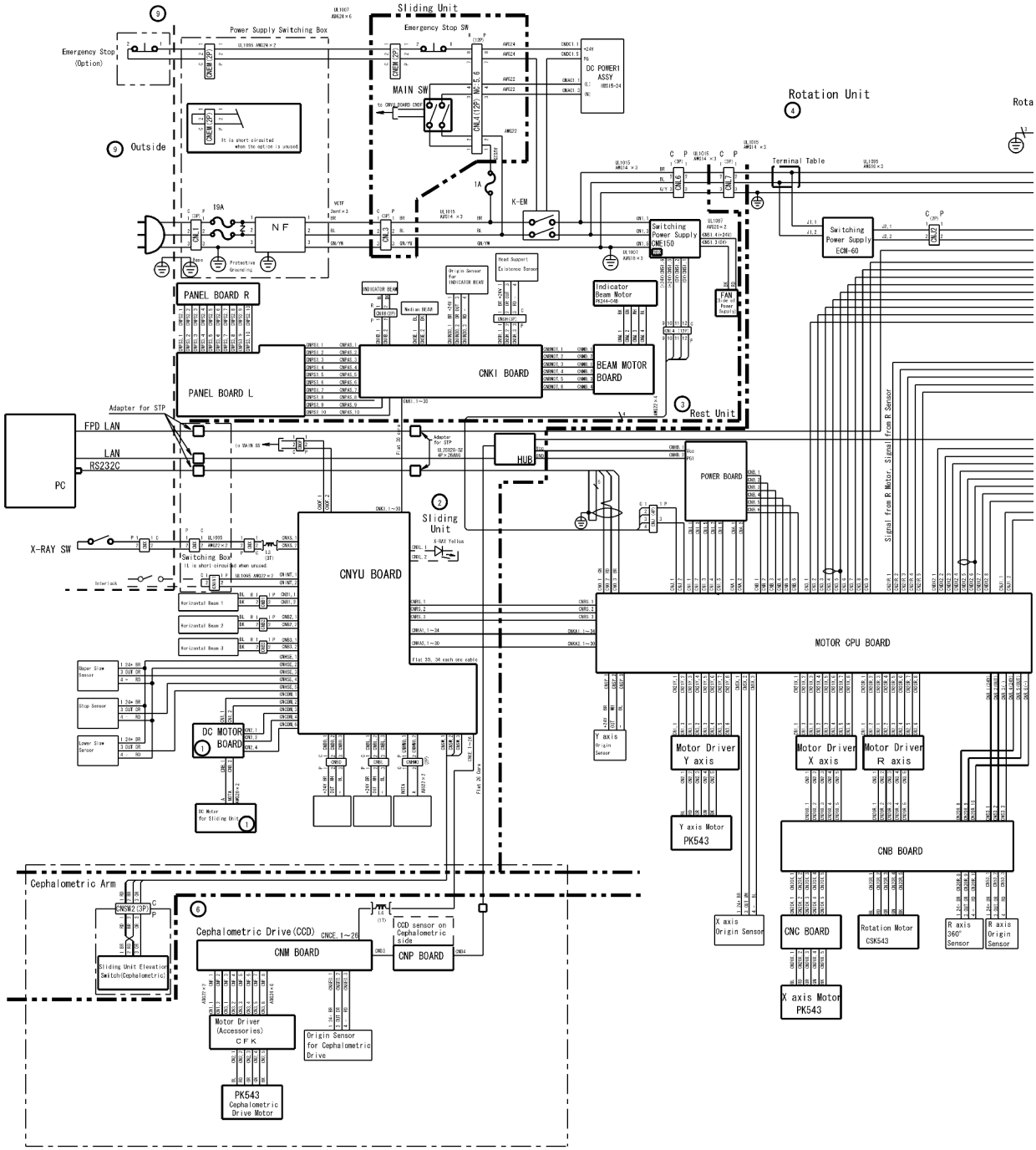
Symbol	Checking Method
○	Check with eyes
●	Check by using measuring instruments etc.
◎	Check by operating the equipment.

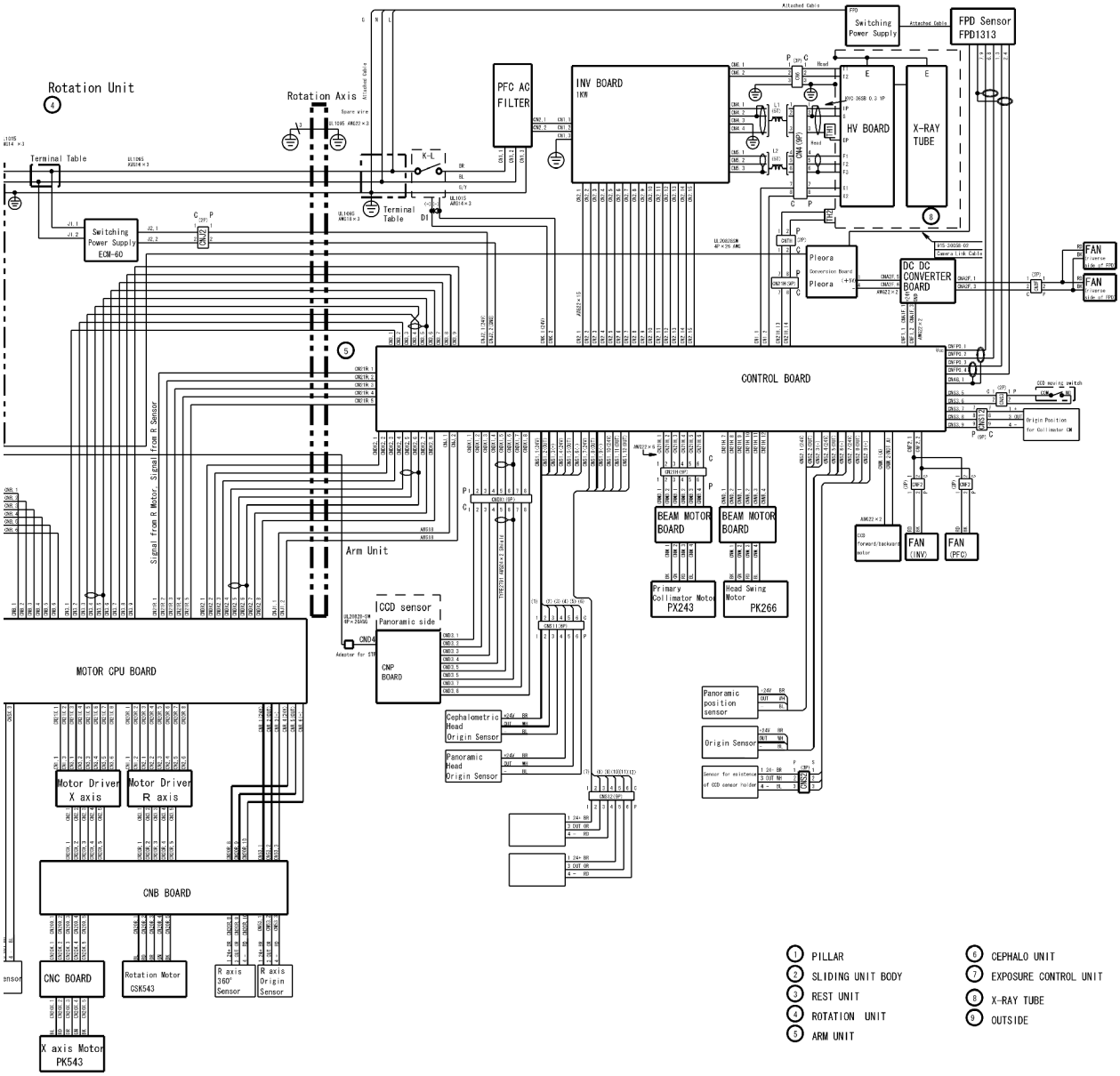
Check Item	Purpose of Check	Contents of Check	Symbol
Environment of Electric Power Source	Checking of the range of electric power voltage	Check the conformity of “Electric power voltage connecting with the equipment” and “Specifications of the equipment”.	●
Appearance and indication	(1) Appearance of The equipment	a Deformation, Damage, Description Plate b Note	○
	(2) Inside of the equipment	Stain, dust	○
Environment of the equipment	Temperature, humidity, and gass	Checking of conformity of the environment Atmosphere where the equipment is used	●
	Levelness of the equipment	Check of the influence to the equipment	●
	Floor and fixing situation of the equipment	Vibration and working stability of the equipment	●
	Checking of intervention	Checking of the safety within the working Area of the equipment	○
	Rusting situation	Checking of the condition of rusting and safety of the function	○
Working test	Working test before Working of the equipment	Checking of the working condition of the equipment	◎
	Working test after The maintenance	Checking of the working condition of the equipment	◎
Safety test of Electric shock	Insulation resistance	Checking of the resistance values between The electric line and earth	●
	Leakage current of The exterior	Checking of current value that leaks from The exterior of the equipment to the earth	●
	Resistance to earth	Resistance value between the metal portion of the outside of the equipment and tip of the earth	●
	Resistance of earth Wire	Resistance value between the earth terminal Of the equipment and the tip of the earth	●

Check Item	Purpose of Check	Contents of Check	Symbol
Working accuracy of the equipment	Movement check of the electric power circuit	Checking of the voltage value of the electric power source circuit	●
	Movement check of the exposure circuit	Checking of the movement ware of the control circuit and setting value	●
	Movement check of the operation circuit	Checking of the movement of the operational Sequence	●
	Accuracy of the Positioning mechanism	Checking of deterioration in the mechanism portion	●
	Checking of The protector circuit	Checking of the setting value and movement Condition of the protector circuit	●
	Checking of the movement Indicator ASSY	Checking of the circuit function to indicate The movement conditions	●
Indication during X-ray exposure	Checking of synchronization with X-ray exposure	Checking of the movement for Indicator ASSY during usage	◎
X-ray Generator	X-ray Tube Head	Checking of any leakage for insulation oil	○
	Lower voltage cable	Checking of wearing, wound, tension, and twist	○
	Exposure cone	Checking of looseness, deformation, and Damage	○
	Filter	Checking of twist and damage	○
	Slit (Collimator)	Gap of exposure field and exposure width	○

Check Item	Purpose of Check	Contents of Check	Symbol
Exposure functions	Rotation and movement of X-ray Tube Head	Checking of slip, abnormal noise, and stopping accuracy	◎
	Movement of ARM		
	Mechanism of patient positioning	Checking of looseness, operativeness, And stability	
	Beams for patient positioning	Checking of brightness and positioning accuracy	○
Mechanism to up and down movement	Wire rope	Checking of cutting of the wires and terminals	○
	Locking	Checking of the movement	◎
	Condition of up and Down movement	Checking of the smooth movement	○
X-ray output	X-ray Tube Voltage	Checking of X-ray Tube Voltage	●
	X-ray Tube Current	Checking of X-ray Tube Current	●
	Exposure Time	Checking of exposure time	●

11. Wiring Diagram




Rotation Unit
Rotation Axis
Terminal Table
Switching Power Supply ECM-60
K-L
PFC AC FILTER
INV BOARD 1KW
Switching Power Supply
FPD Sensor FPD1313
HV BOARD
X-RAY TUBE
Pleora
DC DC CONVERTER BOARD
FAN
CONTROL BOARD
Signal from R Motor
Signal from R Sensor
Arm Unit
CCD sensor
Panoramic side
CNP BOARD
BEAM MOTOR BOARD
BEAM MOTOR BOARD
Primary Collimator Motor PX243
Head Swing Motor PK266
FAN (INV)
FAN (PFC)
MOTOR CPU BOARD
Motor Driver X axis
Motor Driver R axis
CNB BOARD
CNC BOARD
Rotation Motor GSK543
R axis 360° Sensor
R axis Origin Sensor
X axis Motor PK543
Cephalometric Head Origin Sensor
Panoramic Head Origin Sensor
Panoramic position sensor
Origin Sensor
1 PILLAR
2 SLIDING UNIT BODY
3 REST UNIT
4 ROTATION UNIT
5 ARM UNIT
6 CEPHALO UNIT
7 EXPOSURE CONTROL UNIT
8 X-RAY TUBE
9 OUTSIDE

12. Revision data of this manual

This manual was created in March 2010.
Revised on August 2011.

Document number : S02-180E